Controls, Start-Up, Operation, Service, and Troubleshooting

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SAFETY CONSIDERATIONS

Installing, starting up, and servicing this equipment can be hazardous due to system pressures, electrical components, and equipment location (roof, elevated structures, mechanical rooms, etc.). Only trained, qualified installers and service mechanics should install, start up, and service this equipment.

When working on this equipment, observe precautions in the literature, and on tags, stickers, and labels attached to the equipment, and any other safety precautions that apply. Follow all safety codes. Wear safety glasses and work gloves. Use care in handling, rigging, and setting this equipment, and in handling all electrical components.

⚠ **WARNING**

Electrical shock can cause personal injury and death. Shut off all power to this equipment during installation. There may be more than one disconnect switch. Tag all disconnect locations to alert others not to restore power until work is completed.

⚠ **WARNING**

DO NOT VENT refrigerant relief valves within a building. Outlet from relief valves must be vented outdoors in accordance with the latest edition of ANSI/ASHRAE (American National Standards Institute/American Society of Heating, Refrigeration and Air Conditioning Engineers) 15 (Safety Code for Mechanical Refrigeration). The accumulation of refrigerant in an enclosed space can displace oxygen and cause asphyxiation. Provide adequate ventilation in enclosed or low overhead areas. Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness or death. Misuse can be fatal. Vapor is heavier than air and reduces the amount of oxygen available for breathing. Product causes eye and skin irritation. Decomposition products are hazardous.

⚠ **WARNING**

DO NOT attempt to unbraze factory joints when servicing this equipment. Compressor oil is flammable and there is no way to detect how much oil may be in any of the refrigerant lines. Cut lines with a tubing cutter as required when performing service. Use a pan to catch any oil that may come out of the lines and as a gage for how much oil to add to system. DO NOT re-use compressor oil.

⚠ **CAUTION**

This unit uses a microprocessor-based electronic control system. Do not use jumpers or other tools to short out components, or to bypass or otherwise depart from recommended procedures. Any short-to-ground of the control board or accompanying wiring may destroy the electronic modules or electrical components.

⚠ **CAUTION**

To prevent potential damage to heat exchanger, always run fluid through heat exchanger when adding or removing refrigerant charge. Use appropriate brine solutions in cooler fluid loop to prevent the freezing of brazed plate heat exchanger, optional hydronic section and/or interconnecting piping when the equipment is exposed to temperatures below 32 F (0 °C). Proof of flow switch and strainer are factory installed on all models. Do NOT remove power from this chiller during winter shutdown periods without taking precaution to remove all water from heat exchanger and optional hydronic system. Failure to properly protect the system from freezing may constitute abuse and may void warranty.

⚠ **CAUTION**

Compressors and optional hydronic system pumps require specific rotation. Test condenser fan(s) first to ensure proper phasing. Swap any two incoming power leads to correct condenser fan rotation before starting any other motors.

⚠ **CAUTION**

Refrigerant charge must be removed slowly to prevent loss of compressor oil that could result in compressor failure.

⚠ **CAUTION**

Puron® refrigerant (R-410A) systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on Puron refrigerant equipment. If service equipment is not rated for Puron refrigerant, equipment damage or personal injury may result.

GENERAL

This publication contains Controls, Start-Up, Operation, Service, and Troubleshooting information for the 30RAP AquaSnap® air-cooled chillers. See Table 1. These chillers are equipped with *Comfort*Link™ controls and electronic expansion valves (EXVs).

> ⚠ **WARNING**
>
> This unit uses a microprocessor-based electronic control system. Do not use jumpers or other tools to short out or bypass components or otherwise depart from recommended procedures. Any short-to-ground of the control board or accompanying wiring may destroy the board or electrical component.

Table 1 — Unit Sizes

UNIT	NOMINAL CAPACITY (TONS)
30RAP010	10
30RAP015	14
30RAP018	16
30RAP020	19
30RAP025	24
30RAP030	28
30RAP035	34
30RAP040	39
30RAP045	43
30RAP050	48
30RAP055	53
30RAP060	56

Conventions Used in This Manual — The following conventions for discussing configuration points for the local display (scrolling marquee or Navigator™ accessory) will be used in this manual.

Point names will be written with the mode name first, then any sub-modes, then the point name, each separated by an arrow symbol (→). Names will also be shown in bold and italics. As an example, the Lead/Lag Circuit Select Point, which is located in the Configuration mode, Option sub-mode, would be written as *Configuration →OPTN→LLCS*.

This path name will show the user how to navigate through the local display to reach the desired configuration. The user would scroll through the modes and sub-modes using the ▲ and ▼ keys. The arrow symbol in the path name represents pressing ENTER to move into the next level of the menu structure.

When a value is included as part of the path name, it will be shown at the end of the path name after an equals sign. If the value represents a configuration setting, an explanation will be shown in parenthesis after the value. As an example, *Configuration→OPTN→LLCS* = **1** (Circuit A leads).

Pressing the ESCAPE and ENTER keys simultaneously will scroll an expanded text description of the point name or value across the display. The expanded description is shown in the local display tables but will not be shown with the path names in text.

The CCN (Carrier Comfort Network®) point names are also referenced in the local display tables for users configuring the unit with CCN software instead of the local display. The CCN tables are located in Appendix B of the manual.

Basic Controls Usage

SCROLLING MARQUEE DISPLAY — The scrolling marquee display is the standard interface display to the *Comfort*Link Control System for 30RAP units. The display has up and down arrow keys, an ENTER key, and an ESCAPE key. These keys are used to navigate through the different levels of the display structure. Press the ESCAPE key until the highest operating level is displayed to move through the top 11 mode levels indicated by LEDs on the left side of the display. See Fig. 1 and Tables 2-14.

Once within a mode or sub-mode, pressing the ENTER and ESCAPE keys simultaneously will put the scrolling marquee display into expanded text mode where the full meaning of all sub-modes, items and their values can be displayed for the current selection. Press the ENTER and ESCAPE keys to return the scrolling marquee display to its default menu of rotating display items (those items in *Run Status→VIEW*). In addition, the password will be disabled, requiring that it be entered again before changes can be made to password protected items. Press the ESCAPE key to exit out of the expanded text mode.

NOTE: When the Language Selection (*Configuration→DISP→LANG*), variable is changed, all appropriate display expansions will immediately change to the new language. No power-off or control reset is required when reconfiguring languages.

When a specific item is located, the item name alternates with the value. Press the ENTER key at a changeable item and the value will be displayed. Press ENTER again and the value will begin to flash indicating that the value can be changed. Use the up and down arrow keys to change the value, and confirm the value by pressing the ENTER key.
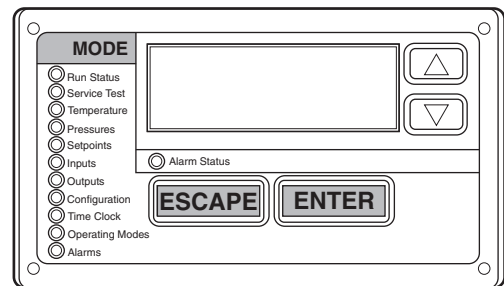
Fig. 1 — Scrolling Marquee Display

Changing item values or testing outputs is accomplished in the same manner. Locate and display the desired item. Press ENTER so that the item value flashes. Use the arrow keys to change the value or state and press the ENTER key to accept it. Press the ESCAPE key to return to the next higher level of structure. Repeat the process as required for other items.

Items in the Configuration and Service Test modes are password protected. The words 'PASS' and 'WORD' will alternate on the display when required. The default password is 0111. Press ENTER and the 1111 password will be displayed. Press ENTER again and the first digit will begin to flash. Use the arrow keys to change the number and press ENTER to accept the digit. Continue with the remaining digits of the password. The password can only be changed through CCN operator interface software such as ComfortWORKS®, ComfortVIEW™ and Service Tool.

See Tables 2-14 and Appendix A for further details.

ACCESSORY NAVIGATOR™ DISPLAY MODULE — The Navigator module provides a mobile user interface to the *Comfort*Link™ control system, which is only available as a field-installed accessory. The display has up and down arrow keys, an ENTER key, and an ESCAPE key. These keys are used to navigate through the different levels of the display structure. Press the ESCAPE key until 'Select a Menu Item' is displayed to move through the top 11 mode levels indicated by LEDs on the left side of the display. See Fig. 2.

Once within a Mode or sub-mode, a ">" indicates the currently selected item on the display screen. Pressing the ENTER and ESCAPE keys simultaneously will put the Navigator module into expanded text mode where the full meaning of all sub-modes, items and their values can be displayed. Pressing the ENTER and ESCAPE keys when the display says 'Select Menu Item' (Mode LED level) will return the Navigator module to its default menu of rotating display items (those items in **Run Status→VIEW**). In addition, the password will be disabled, requiring that it be entered again before changes can be made to password protected items. Press the ESCAPE key to exit out of the expanded text mode.

NOTE: When the Language Selection (**Configuration→DISP→LANG**), variable is changed, all appropriate display expansions will immediately change to the new language. No power-off or control reset is required when reconfiguring languages.

When a specific item is located, the item name appears on the left of the display, the value will appear near the middle of the display and the units (if any) will appear on the far right of the display. Press the ENTER key at a changeable item and the value will begin to flash. Use the up and down arrow keys to change the value, and confirm the value by pressing the ENTER key.

Changing item values or testing outputs is accomplished in the same manner. Locate and display the desired item. Press ENTER so that the item value flashes. Use the arrow keys to change the value or state and press the ENTER key to accept it. Press the ESCAPE key to return to the next higher level of structure. Repeat the process as required for other items.

Items in the Configuration and Service Test modes are password protected. The words **Enter Password** will be displayed when required, with 1111 also being displayed. The default password is 1111. Use the arrow keys to change the number and press ENTER to enter the digit. Continue with the remaining digits of the password. The password can only be changed through CCN operator interface software such as ComfortWORKS, ComfortVIEW and Service Tool.

Adjusting the Contrast — The contrast of the display can be adjusted to suit ambient conditions. To adjust the contrast of the Navigator module, press the ESCAPE key until the display reads, "Select a menu item." Using the arrow keys move to the Configuration mode. Press ENTER to obtain access to this mode. The display will read:

> > TEST OFF
> METR OFF
> LANG ENGLISH

Pressing ENTER will cause the "OFF" to flash. Use the up or down arrow to change "OFF" to "ON". Pressing ENTER will illuminate all LEDs and display all pixels in the view screen. Pressing ENTER and ESCAPE simultaneously allows the user to adjust the display contrast. Use the up or down arrows to adjust the contrast. The screen's contrast will change with the adjustment. Press ENTER to accept the change. The Navigator module will keep this setting as long as it is plugged in to the LEN bus.

Adjusting the Backlight Brightness — The backlight of the display can be adjusted to suit ambient conditions. The factory default is set to the highest level. To adjust the backlight of the Navigator module, press the ESCAPE key until the display reads, "Select a menu item." Using the arrow keys move to the Configuration mode. Press ENTER to obtain access to this mode. The display will read:

> > TEST OFF
> METR OFF
> LANG ENGLISH

Pressing ENTER will cause the "OFF" to flash. Use the up or down arrow keys to change "OFF" to "ON". Pressing ENTER will illuminate all LEDs and display all pixels in the view screen. Pressing the up and down arrow keys simultaneously allows the user to adjust the display brightness. Use the up or down arrow keys to adjust screen brightness. Press ENTER to accept the change. The Navigator module will keep this setting as long as it is plugged in to the LEN bus.

Fig. 2 — Accessory Navigator™ Display Module

Table 2 — Scrolling Marquee Display Menu Structure*

MODE	RUN STATUS	SERVICE TEST	TEMPERATURES	PRESSURES	SET POINTS	INPUTS	OUTPUTS	CONFIGURATION	TIME CLOCK	OPERATING MODES	ALARMS
SUB-MODE	Auto View of Run Status (VIEW)	Service Test Mode (TEST)	Ent and Leave Unit Temps (UNIT)	Pressures Ckt A (PRC.A)	Cooling Setpoints (COOL)	General Inputs (GEN.I)	General Outputs (GEN.O)	Display Configuration (DISP)	Time of Day (TIME)	Modes (MODE)	Current (CRNT)
	Unit Run Hour and Start (RUN)	Outputs and Pumps (OUTS)	Temperatures Ckt A (CIR.A)	Pressures Ckt B (PRC.B)	Head Pressure Setpoint (HEAD)	Circuit Inputs (CRCT)	Outputs Circuit A EXV (A.EXV)	Unit Configuration (UNIT)	Month, Date, Day, and Year (DATE)		Reset Alarms (RCRN)
	Compressor Run Hours (HOUR)	Ciruit A Comp Test (CMPA)	Temperatures Ckt B (CIR.B)		Brine Freeze Setpoint (FRZ)	4-20mA Inputs (4-20)	Outputs Circuit B EXV (B.EXV)	Unit Options 1 Hardware (OPT1)	Daylight Savings Time (DST)		Alarm History (HIST)
	Compressor Starts (STRT)	Ciruit B Comp Test (CMPB)					Outputs Circuit A (CIR.A)	Unit Options 2 Controls (OPT2)	Local Holiday Schedules (HOL.L)		
	Preventive Maintenance (PM)						Outputs Circuit B (CIR.B)	CCN Network Configuration (CCN)	Local Occupancy Schedule (SCH.L)		
	Software Version (VERS)							Head Pressure Comp. Delta (HP.A)	Schedule Override (OVR)		
								Head Pressure Comp. Delta (HP.B)			
								Cir. A EXV Configuration (EXV.A)			
								Cir. B EXV Configuration (EXV.B)			
								Motormaster Configuration (MM)			
								Reset Cool Temp (RSET)			
								Set Point and Ramp Load (SLCT)			
								Service Configuration (SERV)			
								Broadcast Configuration (BCST)			

LEGEND

Ckt — Circuit

*Throughout this text, the location of items in the menu structure will be described in the following format:

Item Expansion (Mode Name→Sub-mode Name→ITEM)

For example, using the language selection item:

Language Selection (**Configuration**→**DISP**→**LANG**)

Table 3 — Run Status Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	SUB-ITEM	DISPLAY	SUB-ITEM	DISPLAY	ITEM EXPANSION	COMMENT
VIEW	ENTER	EWT	XXX.X °F					ENTERING FLUID TEMP	
	↓	LWT	XXX.X °F					LEAVING FLUID TEMP	
	↓	SETP	XXX.X °F					ACTIVE SETPOINT	
	↓	CTPT	XXX.X °F					CONTROL POINT	
	↓	LOD.F	XXX					LOAD/UNLOAD FACTOR	
	↓	STAT	X					CONTROL MODE	0 = Service Test 1 = Off Local 2 = Off CCN 3 = Off Time 4 = Off Emrgcy 5 = On Local 6 = On CCN 7 = On Time 8 = Ht Enabled 9 = Pump Delay
	↓	LD.PM						LEAD PUMP	
	↓	OCC	YES/NO					OCCUPIED	
	↓	LS.AC	YES/NO					LOW SOUND ACTIVE	
	↓	MODE	YES/NO					OVERRIDE MODES IN EFFECT	
	↓	CAP	XXX %					PERCENT TOTAL CAPACITY	
	↓	STGE	X					REQUESTED STAGE	
	↓	ALRM	XXX					CURRENT ALARMS & ALERTS	
	↓	TIME	XX.XX					TIME OF DAY	00.00-23.59
	↓	MNTH	XX					MONTH OF YEAR	1 = January, 2 = February, etc.
	↓	DATE	XX					DAY OF MONTH	01-31
	↓	YEAR	XX					YEAR OF CENTURY	
RUN	ENTER	HRS.U	XXXX HRS					MACHINE OPERATING HOURS	
	↓	STR.U	XXXX					MACHINE STARTS	
	↓	HR.P1	XXXX.X					PUMP 1 RUN HOURS	
	↓	HR.P2	XXXX.X					PUMP 2 RUN HOURS	
HOUR	ENTER	HRS.A	XXXX HRS					CIRCUIT A RUN HOURS	
	↓	HRS.B	XXXX HRS					CIRCUIT B RUN HOURS	See Note
	↓	HR.A1	XXXX HRS					COMPRESSOR A1 RUN HOURS	
	↓	HR.A2	XXXX HRS					COMPRESSOR A2 RUN HOURS	
	↓	HR.B1	XXXX HRS					COMPRESSOR B1 RUN HOURS	See Note
	↓	HR.B2	XXXX HRS					COMPRESSOR B2 RUN HOURS	See Note
STRT	ENTER	ST.A1	XXXX					COMPRESSOR A1 STARTS	
	↓	ST.A2	XXXX					COMPRESSOR A2 STARTS	
	↓	ST.B1	XXXX					COMPRESSOR B1 STARTS	See Note
	↓	ST.B2	XXXX					COMPRESSOR B2 STARTS	See Note
PM	ENTER	PUMP						PUMP MAINTENANCE	
	ENTER			SI.PM	XXXX HRS			PUMP SERVICE INTERVAL	Default: 8760
	↓			P.1.DN	XXXX HRS			PUMP 1 SERVICE COUNTDOWN	
	↓			P.2.DN	XXXX HRS			PUMP 2 SERVICE COUNTDOWN	
	↓			P.1.MN	YES/NO			PUMP 1 MAINTENANCE DONE	User Entry
	↓			P.2.MN	YES/NO			PUMP 2 MAINTENANCE DONE	User Entry

NOTE: If the unit has a single circuit, the Circuit B items will not appear in the display, except the ability to configure circuit B will be displayed.

Table 3 — Run Status Mode and Sub-Mode Directory (cont)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	SUB-ITEM	DISPLAY	SUB-ITEM	DISPLAY	ITEM EXPANSION	COMMENT
PM (cont)	↓			PMDT				PUMP MAINTENANCE DATES	
	ENTER					P.1.M0		MM/DD/YY HH:MM	
	↓					P.1.M1		MM/DD/YY HH:MM	
	↓					P.1.M2		MM/DD/YY HH:MM	
	↓					P.1.M3		MM/DD/YY HH:MM	
	↓					P.1.M4		MM/DD/YY HH:MM	
	↓					P.2.M0		MM/DD/YY HH:MM	
	↓					P.2.M1		MM/DD/YY HH:MM	
	↓					P.2.M2		MM/DD/YY HH:MM	
	↓					P.2.M3		MM/DD/YY HH:MM	
	↓					P.2.M4		MM/DD/YY HH:MM	
	ENTER	STRN						STRAINER MAINTENANCE	
	ENTER			SI.ST	XXXX HRS			STRAINER SRVC INTERVAL	Default: 8760
	↓			S.T.DN	XXXX HRS			STRAINER SRVC COUNTDOWN	
	↓			S.T.MN	YES/NO			STRAINER MAINT. DONE	User Entry
	↓			ST.DT				STRAINER MAINT. DATES	
	ENTER					S.T.M0		MM/DD/YY HH:MM	
	↓					S.T.M1		MM/DD/YY HH:MM	
	↓					S.T.M2		MM/DD/YY HH:MM	
	↓					S.T.M3		MM/DD/YY HH:MM	
	↓					S.T.M4		MM/DD/YY HH:MM	
	ENTER	COIL						COIL MAINTENANCE	
	ENTER			SI.CL	XXXX HRS			COIL SRVC INTER	Default: 8760
	↓			C.L.DN	XXXX HRS			COIL SERVICE COUNTDOWN	
	↓			C.L.MN	YES/NO			COIL MAINT. DONE	User Entry
	↓			CL.DT				COIL MAINTENANCE DATES	
	ENTER					C.L.M0		MM/DD/YY HH:MM	
	↓					C.L.M1		MM/DD/YY HH:MM	
	↓					C.L.M2		MM/DD/YY HH:MM	
	↓					C.L.M3		MM/DD/YY HH:MM	
	↓					C.L.M4		MM/DD/YY HH:MM	
VERS	ENTER	MBB						CESR131460-xx-xx	xx-xx is Version number*
	↓	EXV						CESR131172-xx-xx	xx-xx is Version number*
	↓	AUX1						CESR131333-xx-xx	xx-xx is Version number*
	↓	EMM						CESR131174-xx-xx	xx-xx is Version number*
	↓	MARQ						CESR131171-xx-xx	xx-xx is Version number*
	↓	NAVI						CESR130227-xx-xx	xx-xx is Version number*

*Press ENTER and ESCAPE simultaneously to obtain version number.

Table 4 — Service Test Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
TEST	ENTER		ON/OFF	SERVICE TEST MODE	To Enable Service Test Mode, move Enable/Off/Remote Contact switch to OFF. Change TEST to ON. Move switch to ENABLE.
OUTS				OUTPUTS AND PUMPS	
	ENTER	EXV.A	0 to 100%	EXV A % OPEN	
	↓	EXV.B	0 to 100%	EXV B % OPEN	
	↓	FAN1	ON/OFF	FAN 1 RELAY	
	↓	FAN2	ON/OFF	FAN 2 RELAY	
	↓	FAN3	ON/OFF	FAN 3 RELAY	
	↓	FAN4	ON/OFF	FAN 4 RELAY	
	↓	FAN5	ON/OFF	FAN 5 RELAY	
	↓	FAN6	ON/OFF	FAN 6 RELAY	
	↓	V.HPA	0 to 100%	VAR HEAD PRESS %	
	↓	V.HPB	0 to 100%	VAR HEAD PRESS %	
	↓	CLP.1	ON/OFF	COOLER PUMP 1 RELAY	
	↓	CLP.2	ON/OFF	COOLER PUMP 2 RELAY	
	↓	UL.TM	0 to 15	COMP A1 UNLOAD TIME	
	↓	CL.HT	ON/OFF	COOLER/PUMP HEATER	
	↓	RMT.A	ON/OFF	REMOTE ALARM RELAY	
CMPA				CIRCUIT A COMPRESSOR TEST	
	ENTER	CC.A1	ON/OFF	COMPRESSOR A1 RELAY	
	↓	UL.TM	0 to 15	COMP A1 UNLOAD TIME	
	↓	CC.A2	ON/OFF	COMPRESSOR A2 RELAY	
	↓	CC.A3	ON/OFF	COMPRESSOR A3 RELAY	
	↓	CC.A4	ON/OFF	COMPRESSOR A4 RELAY	
	↓	MLV	ON/OFF	MINIMUM LOAD VALVE RELAY	
CMPB				CIRCUIT B COMPRESSOR TEST	See Note
	ENTER	CC.B1	ON/OFF	COMPRESSOR B1 RELAY	
	↓	CC.B2	ON/OFF	COMPRESSOR B2 RELAY	
	↓	CC.B3	ON/OFF	COMPRESSOR B3 RELAY	
	↓	CC.B4	ON/OFF	COMPRESSOR B4 RELAY	

NOTE: If the unit has a single circuit, the Circuit B items will not appear in the display, except the ability to configure circuit B will be displayed.

Table 5 — Temperature Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
UNIT				ENT AND LEAVE UNIT TEMPS	
	ENTER	CEWT	XXX.X °F	COOLER ENTERING FLUID	
	↓	CLWT	XXX.X °F	COOLER LEAVING FLUID	
	↓	OAT	XXX.X °F	OUTSIDE AIR TEMPERATURE	
	↓	SPT	XXX.X °F	SPACE TEMPERATURE	
	↓	DLWT	XXX.X °F	LEAD/LAG LEAVING FLUID	
CIR.A				TEMPERATURES CIRCUIT A	
	ENTER	SCT.A	XXX.X °F	SATURATED CONDENSING TMP	
	↓	SST.A	XXX.X °F	SATURATED SUCTION TEMP	
	↓	RGT.A	XXX.X °F	COMPR RETURN GAS TEMP	
	↓	D.GAS	XXX.X °F	DISCHARGE GAS TEMP	
	↓	SH.A	XXX.X ^F	SUCTION SUPERHEAT TEMP	
CIR.B				TEMPERATURES CIRCUIT B	See Note
	ENTER	SCT.B	XXX.X °F	SATURATED CONDENSING TMP	See Note
	↓	SST.B	XXX.X °F	SATURATED SUCTION TEMP	See Note
	↓	RGT.B	XXX.X °F	COMPR RETURN GAS TEMP	See Note
	↓	SH.B	XXX.X ^F	SUCTION SUPERHEAT TEMP	See Note

NOTE: If the unit has a single circuit, the Circuit B items will not appear in the display, except the ability to configure circuit B will be displayed.

Table 6 — Pressure Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
PRC.A				PRESSURES CIRCUIT A	
	ENTER	DP.A	XXX.X PSIG	DISCHARGE PRESSURE	
	↓	SP.A	XXX.X PSIG	SUCTION PRESSURE	
PRC.B				PRESSURES CIRCUIT B	See Note
	ENTER	DP.B	XXX.X PSIG	DISCHARGE PRESSURE	See Note
	↓	SP.B	XXX.X PSIG	SUCTION PRESSURE	See Note

NOTE: If the unit has a single circuit, the Circuit B items will not appear in the display, except the ability to configure circuit B will be displayed.

Table 7 — Set Points Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
COOL				COOLING SETPOINTS	
	ENTER	CSP.1	XXX.X °F	COOLING SETPOINT 1	Default: 44 F
	↓	CSP.2	XXX.X °F	COOLING SETPOINT 2	Default: 44 F
	↓	CSP.3	XXX.X °F	ICE SETPOINT	Default: 32 F
HEAD				HEAD PRESSURE SETPOINTS	
	ENTER	H.DP	XXX.X °F	HEAD SETPOINT	Default: 95 F
	↓	F.ON	XXX.X °F	FAN ON SETPOINT	Default: 95 F
	↓	F.OFF	XXX.X °F	FAN OFF SETPOINT	Default: 72 F
	↓	B.OFF	XXX.X °F	BASE FAN OFF DELTA TEMP	Default: 23 F
	↓	F.DLT	XXX.X °F	FAN STAGE DELTA	Default: 15 F
FRZ				BRINE FREEZE SETPOINT	
	ENTER	BR.FZ	XXX.X °F	BRINE FREEZE POINT	Default: 34 F

Table 8 — Inputs Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
GEN.I				GENERAL INPUTS	
	ENTER	STST	STRT/STOP	START/STOP SWITCH	
	↓	FLOW	ON/OFF	COOLER FLOW SWITCH	
	↓	PM.F.1	OPEN/CLSE	COOLER PUMP 1 INTERLOCK	
	↓	PM.F.2	OPEN/CLSE	COOLER PUMP 2 INTERLOCK	
	↓	HT.RQ	ON/OFF	HEAT REQUEST	
	↓	DLS1	ON/OFF	DEMAND LIMIT SWITCH 1	
	↓	DLS2	ON/OFF	DEMAND LIMIT SWITCH 2	
	↓	ICED	ON/OFF	ICE DONE	
	↓	DUAL	ON/OFF	DUAL SETPOINT SWITCH	
CRCT				CIRCUITS INPUTS	
	ENTER	FKA1	ON/OFF	COMPRESSOR A1 FEEDBACK	
	↓	FKA2	ON/OFF	COMPRESSOR A2 FEEDBACK	
	↓	FKA3	ON/OFF	COMPRESSOR A3 FEEDBACK	
	↓	FKA4	ON/OFF	COMPRESSOR A4 FEEDBACK	
	↓	FKB1	ON/OFF	COMPRESSOR B1 FEEDBACK	See Note
	↓	FKB2	ON/OFF	COMPRESSOR B2 FEEDBACK	See Note
	↓	FKB3	ON/OFF	COMPRESSOR B3 FEEDBACK	See Note
	↓	FKB4	ON/OFF	COMPRESSOR B4 FEEDBACK	See Note
4-20				4-20 MA INPUTS	
	ENTER	DMND	XX.X MA	4-20 MA DEMAND SIGNAL	
	↓	RSET	XX.X MA	4-20 MA RESET SIGNAL	
	↓	CSP	XX.X MA	4-20 MA COOLING SETPOINT	

NOTE: If the unit has a single circuit, the Circuit B items will not appear in the display, except the ability to configure circuit B will be displayed.

Table 9 — Outputs Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
GEN.O				GENERAL OUTPUTS	
	ENTER	FAN1	ON/OFF	FAN 1 RELAY	
	↓	FAN2	ON/OFF	FAN 2 RELAY	
	↓	FAN3	ON/OFF	FAN 3 RELAY	
	↓	FAN4	ON/OFF	FAN 4 RELAY	
	↓	FAN5	ON/OFF	FAN 5 RELAY	
	↓	FAN6	ON/OFF	FAN 6 RELAY	
	↓	V.HPA	ON/OFF	FAN SPEED CIRCUIT A	
	↓	V.HPB	ON/OFF	FAN SPEED CIRCUIT B	
	↓	C.WP1	ON/OFF	COOLER PUMP RELAY 1	
	↓	C.WP2	ON/OFF	COOLER PUMP RELAY 2	
	↓	CLHT	ON/OFF	COOLER/PUMP HEATER	
	↓	MLV.R	ON/OFF	MINIMUM LOAD VALVE RELAY	

Table 9 — Outputs Mode and Sub-Mode Directory (cont)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
A.EXV				OUTPUTS CIRCUIT A EXV	
	ENTER	EXV.A	0 to 100%	EXV % OPEN	
	↓	APPR	ON/OFF	CIRCUIT A APPROACH	
	↓	AP.SP		APPROACH SETPOINT	
	↓	X.SH.R		SH RESET AT MAX UNL-DIG	
	↓	S.SH.R		DIGLOAD TO START SH RST	
	↓	SH_R		AMOUNT OF SH RESET	
	↓	OVR.A		EXVA OVERRIDE	
	↓	SPH.A		SUCTION SUPERHEAT TEMP	
	↓	ASH.S		ACTIVE SUPERHEAT SETPT	
	↓	AMP.S		ACTIVE MOP SETPT	
	↓	PLM.A		CIR A EXV POSITION LIMIT	
	↓	SPR.1		SPARE 1 TEMPERATURE	
B.EXV				OUTPUTS CIRCUIT B EXV	
	ENTER	EXV.B	0 to 100%	EXV % OPEN	
	↓	APPR	ON/OFF	CIRCUIT B APPROACH	
	↓	AP.SP		APPROACH SETPOINT	
	↓	OVR.B		EXVB OVERRIDE	
	↓	SPH.B		SUCTION SUPERHEAT TEMP	
	↓	ASH.S		ACTIVE SUPERHEAT SETPT	
	↓	AMP.S		ACTIVE MOP SETPT	
	↓	PLM.B		CIR B EXV POSITION LIMIT	
	↓	SPR.2		SPARE 2 TEMPERATURE	
CIR.A				OUTPUTS CIRCUIT A	
	ENTER	CC.A1	ON/OFF	COMPRESSOR A1 RELAY	
	↓	DPE.R	ON/OFF	COMP A1 LOAD PERCENT	
	↓	CC.A2	ON/OFF	COMPRESSOR A2 RELAY	
	↓	CC.A3	ON/OFF	COMPRESSOR A3 RELAY	
	↓	CC.A4	ON/OFF	COMPRESSOR A4 RELAY	
CIR.B				OUTPUTS CIRCUIT B (See Note)	
	ENTER	CC.B1	ON/OFF	COMPRESSOR B1 RELAY	
	↓	CC.B2	ON/OFF	COMPRESSOR B2 RELAY	
	↓	CC.B3	ON/OFF	COMPRESSOR B3 RELAY	
	↓	CC.B4	ON/OFF	COMPRESSOR B4 RELAY	

NOTE: If the unit has a single circuit, the Circuit B items will not appear in the display, except the ability to configure circuit B will be displayed.

Table 10 — Configuration Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
DISP				DISPLAY CONFIGURATION	
	ENTER	TEST	ON/OFF	TEST DISPLAY LEDS	
	↓	METR	ON/OFF	METRIC DISPLAY	Off = English; On = Metric
	↓	LANG	X	LANGUAGE SELECTION	Default: 0 0 = English 1 = Espanol 2 = Francais 3 = Portuguese
	↓	PAS.E	ENBL/DSBL	PASSWORD ENABLE	Default: Enable
	↓	PASS	xxxx	SERVICE PASSWORD	Default: 1111

NOTE: If the unit has a single circuit, the Circuit B items will not appear in the display, except the ability to configure circuit B will be displayed.

Table 10 — Configuration Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
UNIT	ENTER			UNIT CONFIGURATION	
	↓	SIZE	XX	UNIT SIZE	
	↓	SZA.1	XX	COMPRESSOR A1 SIZE	Unit Dependent
	↓	SZA.2	XX	COMPRESSOR A2 SIZE	Unit Dependent
	↓	SZA.3	XX	COMPRESSOR A3 SIZE	Unit Dependent
	↓	SZA.4	XX	COMPRESSOR A4 SIZE	Unit Dependent
	↓	SZB.1	XX	COMPRESSOR B1 SIZE	Unit Dependent
	↓	SZB.2	XX	COMPRESSOR B2 SIZE	Unit Dependent
	↓	SZB.3	XX	COMPRESSOR B3 SIZE	Unit Dependent
	↓	SZB.4	XX	COMPRESSOR B4 SIZE	Unit Dependent
	↓	SH.SP	XX.X ∆F	SUPERHEAT SETPOINT	Default: 9 °F
	↓	FAN.S		NUMBER OF FANS	1 = One Fan 2 = Two Fans 3 = Three Fans 4 = Four Fans
	↓	EXV	YES/NO	EXV MODULE INSTALLED?	Default: Yes
	↓	A1.TY	YES/NO	COMPRESSOR A1 DIGITAL?	Default: No Yes = A1 Compressor is Digital Scroll
	↓	MAX.T	0 to 12	MAXIMUM A1 UNLOAD TIME	Default: 7 Max 12 010,015 Max 10 018-060
OPT1				UNIT OPTIONS 1 HARDWARE	
	ENTER	FLUD	X	COOLER FLUID	Default: Water 1 = Water 2 = Medium Temperature Brine
	↓	MLV.S	YES/NO	MINIMUM LOAD VALVE SELECT	Default: No
	↓	D.G.EN	ENBL/DSBL	DISCHARGE GAS TEMP ENABLE	
	↓	CSB.E	ENBL/DSBL	CSB BOARDS ENABLE	
	↓	CPC	ON/OFF	COOLER PUMP CONTROL	Default: Off
	↓	PM1E	YES/NO	COOLER PUMP 1 ENABLE	
	↓	PM2E	YES/NO	COOLER PUMP 2 ENABLE	
	↓	PM.P.S	YES/NO	COOLER PMP PERIODIC STRT	Default: No
	↓	PM.SL	X	COOLER PUMP SELECT	Default: Automatic 0 = Automatic 1 = Pump 1 Starts first 2 = Pump 2 Starts first
	↓	PM.DY	XX MIN	COOLER PUMP SHUTDOWN DLY	0 to 10 minutes, Default: 1 min.
	↓	PM.DT	XXXX HRS	PUMP CHANGEOVER HOURS	Default: 500 hours
	↓	ROT.P	YES/NO	ROTATE COOLER PUMPS NOW	User Entry
	↓	EMM	YES/NO	EMM MODULE INSTALLED	
	↓	CND.T	0,1	COND HX	0 = RTPF 1 = MCHX Default MCHX
	↓	MOPS	XX	EXV MOP SET POINT	Range: 40 - 80 Default: 50
	↓	APPR	XX	CONFIG APPROACH SETPOINT	Range: 5 - 40 Default: 9.0

Table 10 — Configuration Mode and Sub-Mode Directory (cont)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
OPT2				UNIT OPTIONS 2 CONTROLS	
	ENTER	CTRL	X	CONTROL METHOD	Default: Switch 0 = Enable/Off/Remote Switch 2 = Occupancy 3 = CCN Control
	↓	LOAD	X	LOADING SEQUENCE SELECT	Default: Equal 1 = Equal 2 = Staged
	↓	LLCS	X	LEAD/LAG CIRCUIT SELECT	Default: Automatic 1 = Automatic 2 = Circuit A Leads 3 = Circuit B Leads
	↓	LCWT	XX.X ∆F	HIGH LCW ALERT LIMIT	Default: 60 Range: 2 to 60 °F
	↓	DELY	XX	MINUTES OFF TIME	Default: 0 Minutes Range: 0 to 15 Minutes
	↓	ICE.M	ENBL/DSBL	ICE MODE ENABLE	Default: Disable
	↓	LS.MD	X	LOW SOUND MODE SELECT	Default: 0 0 = Mode Disable 1 = Fan Noise Only 2 = Fan/Compressor Noise
	↓	LS.ST	00:00	LOW SOUND START TIME	Default: 00:00
	↓	LS.ND	00:00	LOW SOUND END TIME	Default: 00:00
	↓	LS.LT	XXX %	LOW SOUND CAPACITY LIMIT	Default: 100% Range: 0 to 100%
CCN				CCN NETWORK CONFIGURATION	
	ENTER	CCNA	XXX	CCN ADDRESS	Default: 1 Range: 1 to 239
	↓	CCNB	XXX	CCN BUS NUMBER	Default: 0 Range: 0 to 239
	↓	BAUD	X	CCN BAUD RATE	Default: 9600 1 = 2400 2 = 4800 3 = 9600 4 = 19,200 5 = 38,400
HP.A				HEAD PRESSURE CMP DELTA	
	ENTER	A1.DT	XX	SCT DELTA FOR COMP A1	Range: 0 - 50 Default: 12
	↓	A2.DT	XX	SCT DELTA FOR COMP A2	Range: 0 - 50 Default: 12
HP.B				HEAD PRESSURE CMP DELTA	
	ENTER	B1.DT	XX	SCT DELTA FOR COMP B1	Range: 0 - 50 Default: 12
	↓	B2.DT	XX	SCT DELTA FOR COMP B2	Range: 0 - 50 Default: 12

Table 10 — Configuration Mode and Sub-Mode Directory (cont)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
EXV.A				CIR A EXV CONFIGURATION	
	ENTER	STR.A	XXX	EXV CIRC.A START POS	Range: 0 - 100 Default: 30
	↓	MIN.A	XXX	EXV CIRC.A MIN POSITION	Range: 0 - 100 Default: 8
	↓	RNG.A	XXXXX	EXVA STEPS IN RANGE	Range: 0 - 65535 Default: *
	↓	SPD.A	XXXXX	EXVA STEPS PER SECOND	Range: 0 - 65535 Default: 200
	↓	POF.A	XXX	EXVA FAIL POSITION IN %	Range: 0 - 100 Default: 0
	↓	MIN.A	XXXXX	EXVA MINIMUM STEPS	Range: 0 - 65535 Default: 0
	↓	MAX.A	XXXXX	EXVA MAXIMUM STEPS	Range: 0 - 65535 Default: *
	↓	OVR.A	XXX	EXVA OVERRUN STEPS	Range: 0 - 65535 Default: 167
	↓	TYP.A	0,1	EXVA STEPPER TYPE	0 = UNIPOLAR 1 = BIPOLAR Default: 1
	↓	H.SCT	XXX	HIGH SCT THRESHOLD	Range: 50 - 140 Default: 115
	↓	X.PCT	XX	OPEN EXV X% ON 2ND COMP	Range: 0 - 30 Default: 10
	↓	X.PER	XX	MOVE EXV X% ON DISCRSOL	Range: 0 - 30 Default: 5
	↓	A.PCT	XXX	PRE-OPEN EXV - FAN ADDING	Range: 0 - 100 Default: 10
	↓	M.PCT	XXX	PRE-CLOSE EXV - FAN SUB	Range: 0 - 100 Default: 10
	↓	S.PCT	XXX	PRE-CLOSE EXV - LAG SHUT	Range: 0 - 100 Default: 10
	↓	DELY	XXX	LAG START DELAY	Range: 0 - 100 Default: 10
EXV.B				CIR B EXV CONFIGURATION	
	ENTER	STR.B	XXX	EXV CIRC.B START POS	Range: 0 - 100 Default: 50
	↓	MIN.B	XXX	EXV CIRC.B MIN POSITION	Range: 0 - 100 Default: 8
	↓	RNG.B	XXXXX	EXVB STEPS IN RANGE	Range: 0 - 65535 Default: *
	↓	SPD.B	XXXXX	EXVB STEPS PER SECOND	Range: 0 - 65535 Default: 200
	↓	POF.B	XXX	EXVB FAIL POSITION IN %	Range: 0 - 100 Default: 0
	↓	MIN.B	XXXXX	EXVB MINIMUM STEPS	Range: 0 - 65535 Default: 0
	↓	MAX.B	XXXXX	EXVB MAXIMUM STEPS	Range: 0 - 65535 Default: *
	↓	OVR.B	XXX	EXVB OVERRUN STEPS	Range: 0 - 65535 Default: 167
	↓	TYP.B	0,1	EXVB STEPPER TYPE	0 = UNIPOLAR 1 = BIPOLAR Default: 1
MM				MOTORMASTER CONFIGURATION	
	ENTER	MMR.S	YES/NO	MOTORMASTER SELECT	
	↓	P.GAN	XX	HEAD PRESSURE P GAIN	Range: -20 - 20 Default: 1.0
	↓	I.GAN	XX	HEAD PRESSURE I GAIN	Range: -20 - 20 Default: 0.1
	↓	D.GAN	XX	HEAD PRESSURE D GAIN	Range: -20 - 20 Default: 0.0
	↓	MIN.S	XXX	MINIMUM FAN SPEED	Range: 0 - 100 Default: 5.0

* Sizes 010-020 and 035-045, default is 1596. Sizes 025,030, and 050-060, default is 2500.

Table 10 — Configuration Mode and Sub-Mode Directory (cont)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
RSET				RESET COOL TEMP	
	ENTER	CRST	X	COOLING RESET TYPE	Default: No Reset 0 = No Reset 1 = 4 to 20 mA Input 2 = Outdoor Air Temperature 3 = Return Fluid 4 = Space Temperature
	↓	MA.DG	XX.X ∆F	4-20 - DEGREES RESET	Default: 0.0 ∆F Range: −30 to 30 ∆F
	↓	RM.NO	XXX.X °F	REMOTE - NO RESET TEMP	Default: 125 F (51.7 C) Range: 0° to 125 F
	↓	RM.F	XXX.X °F	REMOTE - FULL RESET TEMP	Default: 0.0° F (-17.8 C) Range: 0° to 125 F
	↓	RM.DG	XX.X °F	REMOTE - DEGREES RESET	Default: 0.0° F Range: −30 to 30 F
	↓	RT.NO	XXX.X ∆F	RETURN - NO RESET TEMP	Default: 10.0 ∆F (5.6 ∆C) Range: 0° to 125 F COOLER ∆T
	↓	RT.F	XXX.X ∆F	RETURN - FULL RESET TEMP	Default: 0.0 ∆F (0.0 ∆C) Range: 0° to 125 F COOLER ∆T
	↓	RT.DG	XX.X °F	RETURN - DEGREES RESET	Default: 0.0° F Range: −30 to 30 F (−34.4 to -1.1 C)
	↓	DMDC	X	DEMAND LIMIT SELECT	Default: None 0 = None 1 = Switch 2 = 4 to 20 mA Input 3 = CCN Loadshed
	↓	DM20	XXX %	DEMAND LIMIT AT 20 MA	Default: 100% Range: 0 to 100%
	↓	SHNM	XXX	LOADSHED GROUP NUMBER	Default: 0 Range: 0 to 99
	↓	SHDL	XXX %	LOADSHED DEMAND DELTA	Default: 0% Range: 0 to 60%
	↓	SHTM	XXX	MAXIMUM LOADSHED TIME	Default: 60 minutes Range: 0 to 120 minutes
	↓	DLS1	XXX %	DEMAND LIMIT SWITCH 1	Default: 80% Range: 0 to 100%
	↓	DLS2	XXX %	DEMAND LIMIT SWITCH 2	Default: 50% Range: 0 to 100%
	↓	LLEN	ENBL/DSBL	LEAD/LAG CHILLER ENABLE	Default: Disable
	↓	MSSL	SLVE/MAST	MASTER/SLAVE SELECT	Default: Master
	↓	SLVA	XXX	SLAVE ADDRESS	Default: 0 Range: 0 to 239
	ENTER	LLBL	X	LEAD/LAG BALANCE SELECT	Default: Master Leads 0 = Master Leads 1 = Slave Leads 2 = Automatic
	↓	LLBD	XXX	LEAD/LAG BALANCE DELTA	Default: 168 hours Range: 40 to 400 hours
	↓	LLDY	XXX	LAG START DELAY	Default: 5 minutes Range: 0 to 30 minutes
	↓	PARA	YES	PARALLEL CONFIGURATION	Default: YES (CANNOT BE CHANGED)
SLCT				SETPOINT AND RAMP LOAD	
	ENTER	CLSP	X	COOLING SETPOINT SELECT	Default: Single 0 = Single 1 = Dual Switch 2 = Dual CCN Occupied 3 = 4 to 20 mA Input (requires EMM)
	↓	RL.S	ENBL/DSBL	RAMP LOAD SELECT	Default: Enable
	↓	CRMP	X.X	COOLING RAMP LOADING	Default: 1.0 Range: 0.2 to 2.0
	↓	SCHD	XX	SCHEDULE NUMBER	Default: 1 Range: 1 to 99
	↓	Z.GN	X.X	DEADBAND MULTIPLIER	Default: 1.0 Range: 1.0 to 4.0
SERV				SERVICE CONFIGURATION	
	ENTER	EN.A1	ENBL/DSBL	ENABLE COMPRESSOR A1	Unit dependent
	↓	EN.A2	ENBL/DSBL	ENABLE COMPRESSOR A2	Unit dependent
	↓	EN.B1	ENBL/DSBL	ENABLE COMPRESSOR B1	Unit dependent
	↓	EN.B2	ENBL/DSBL	ENABLE COMPRESSOR B2	Unit dependent

Table 10 — Configuration Mode and Sub-Mode Directory (cont)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
BCST				BROADCAST CONFIGURATION	
	ENTER	T.D.BC	ON/OFF	CCN TIME/DATE BROADCAST	
	↓	OAT.B	ON/OFF	CCN OAT BROADCAST	
	↓	G.S.BC	ON/OFF	GLOBAL SCHEDULE BROADCAST	
	↓	BC.AK	ON/OFF	CCN BROADCAST ACK'ER	

Table 11 — Time Clock Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	SUB-ITEM	DISPLAY	ITEM EXPANSION	COMMENT
TIME						TIME OF DAY	
	ENTER	HH.MM	XX.XX			HOUR AND MINUTE	Military (00:00 – 23:59)
DATE						MONTH,DATE,DAY AND YEAR	
	ENTER	MNTH	XX			MONTH OF YEAR	1-12 (1 = January, 2 = February, etc)
	↓	DOM	XX			DAY OF MONTH	Range: 01-31
	↓	DAY	X			DAY OF WEEK	1-7 (1 = Sunday, 2 = Monday, etc)
	↓	YEAR	XXXX			YEAR OF CENTURY	
DST						DAYLIGHT SAVINGS TIME	
	ENTER	STR.M	XX			MONTH	Default: 4, Range 1 – 12
	↓	STR.W	X			WEEK	Default: 1, Range 1 – 5
	↓	STR.D	X			DAY	Default: 7, Range 1 – 7
	↓	MIN.A	XX			MINUTES TO ADD	Default: 60, Range 0 – 99
	↓	STP.M	XX			MONTH	Default: 10, Range 1 – 12
	↓	STP.W	XX			WEEK	Default: 5, Range 1 – 5
	↓	STP.D	XX			DAY	Default: 7, Range 1 – 7
	↓	MIN.S	XX			MINUTES TO SUBTRACT	Default: 60, Range 0 – 99
HOL.L						LOCAL HOLIDAY SCHEDULES	HD.01 through HD.30
	ENTER	MON	XX			HOLIDAY START MONTH	Range 0 – 12
	↓	DAY	XX			START DAY	Range 0 – 31
	↓	LEN	XX			DURATION (DAYS)	Range 0 - 99
SCH.N			XX			SCHEDULE NUMBER	Default: 1, Range 1 – 99
SCH.L						LOCAL OCCUPANCY SCHEDULE	
	ENTER	PER.1				OCCUPANCY PERIOD 1*	
	ENTER			OCC.1	XX:XX	PERIOD OCCUPIED TIME	Military (00:00 – 23:59)
	↓			UNC.1	XX.XX	PERIOD UNOCCUPIED TIME	Military (00:00 – 23:59)
	↓			MON.1	YES/NO	MONDAY IN PERIOD	
	↓			TUE.1	YES/NO	TUESDAY IN PERIOD	
	↓			WED.1	YES/NO	WEDNESDAY IN PERIOD	
	↓			THU.1	YES/NO	THURSDAY IN PERIOD	
	↓			FRI.1	YES/NO	FRIDAY IN PERIOD	
	↓			SAT.1	YES/NO	SATURDAY IN PERIOD	
	↓			SUN.1	YES/NO	SUNDAY IN PERIOD	
	↓			HOL.1	YES/NO	HOLIDAY IN PERIOD	

* Repeats for Occupancy Periods 2 through 8.

Table 11 — Time Clock Mode and Sub-Mode Directory (cont)

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	SUB-ITEM	DISPLAY	ITEM EXPANSION	COMMENT
OVR						SCHEDULE OVERRIDE	
	ENTER	OVR.T	X			TIMED OVERRIDE HOURS	Default: 0, Range 0-4 hours
	↓	OVR.L	X			OVERRIDE TIME LIMIT	Default: 0, Range 0-4 hours
	↓	T.OVR	YES/NO			TIMED OVERRIDE	User Entry

Table 12 — Operating Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
MODE				MODES CONTROLLING UNIT	
	ENTER	MD01	ON/OFF	CSM CONTROLLING CHILLER	
	↓	MD02	ON/OFF	WSM CONTROLLING CHILLER	
	↓	MD03	ON/OFF	MASTER/SLAVE CONTROL	
	↓	MD05	ON/OFF	RAMP LOAD LIMITED	
	↓	MD06	ON/OFF	TIMED OVERRIDE IN EFFECT	
	↓	MD07	ON/OFF	LOW COOLER SUCTION TEMPA	
	↓	MD08	ON/OFF	LOW COOLER SUCTION TEMPB	
	↓	MD09	ON/OFF	SLOW CHANGE OVERRIDE	
	↓	MD10	ON/OFF	MINIMUM OFF TIME ACTIVE	
	↓	MD13	ON/OFF	DUAL SETPOINT	
	↓	MD14	ON/OFF	TEMPERATURE RESET	
	↓	MD15	ON/OFF	DEMAND/SOUND LIMITED	
	↓	MD16	ON/OFF	COOLER FREEZE PROTECTION	
	↓	MD17	ON/OFF	LOW TEMPERATURE COOLING	
	↓	MD18	ON/OFF	HIGH TEMPERATURE COOLING	
	↓	MD19	ON/OFF	MAKING ICE	
	↓	MD20	ON/OFF	STORING ICE	
	↓	MD21	ON/OFF	HIGH SCT CIRCUIT A	
	↓	MD22	ON/OFF	HIGH SCT CIRCUIT B	
	↓	MD23	ON/OFF	MINIMUM COMP ON TIME	
	↓	MD24	ON/OFF	PUMP OFF DELAY TIME	
	↓	MD25	ON/OFF	LOW SOUND MODE	

LEGEND

CSM — Chillervisor System Manager
SCT — Saturated Condensing Temperature
WSM — Water System Manager

Table 13 — Alarms Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	ITEM EXPANSION	COMMENT
CRNT	ENTER	AXXX OR TXXX	CURRENTLY ACTIVE ALARMS	Alarms are shown as AXXX. Alerts are shown as TXXX.
RCRN	ENTER	YES/NO	RESET ALL CURRENT ALARMS	
HIST	ENTER	AXXX OR TXXX	ALARM HISTORY	Alarms are shown as AXXX. Alerts are shown as TXXX.

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Table 14 — Operating Modes

MODE NO.	ITEM EXPANSION	DESCRIPTION
01	CSM CONTROLLING CHILLER	Chillervisor System Manager (CSM) is controlling the chiller.
02	WSM CONTROLLING CHILLER	Water System Manager (WSM) is controlling the chiller.
03	MASTER/SLAVE CONTROL	Dual Chiller control is enabled.
05	RAMP LOAD LIMITED	Ramp load (pull-down) limiting in effect. In this mode, the rate at which leaving fluid temperature is dropped is limited to a predetermined value to prevent compressor overloading. See Cooling Ramp Loading (**Configuration→SLCT→CRMP**). The pull-down limit can be modified, if desired, to any rate from 0.2° F to 2° F (0.1° to 1° C)/minute.
06	TIMED OVERRIDE IN EFFECT	Timed override is in effect. This is a 1 to 4 hour temporary override of the programmed schedule, forcing unit to Occupied mode. Override can be implemented with unit under Local (Enable) or CCN (Carrier Comfort Network®) control. Override expires after each use.
07	LOW COOLER SUCTION TEMPA	Circuit A cooler Freeze Protection mode. At least one compressor must be on, and the Saturated Suction Temperature is not increasing greater than 1.1° F (0.6° C) in 10 seconds. If the saturated suction temperature is less than the Brine Freeze Point (**Set Points→FRZ →BR.FZ**) minus 6° F (3.4° C) and less than the leaving fluid temperature minus 14° F (7.8° C) for 2 minutes, a stage of capacity will be removed from the circuit. Or, If the saturated suction temperature is less than the Brine Freeze Point minus 14° F (7.8° C), for 90 seconds, a stage of capacity will be removed from the circuit. The control will continue to decrease capacity as long as either condition exists.
08	LOW COOLER SUCTION TEMPB	Circuit B cooler Freeze Protection mode. At least one compressor must be on, and the Saturated Suction Temperature is not increasing greater than 1.1° F (0.6° C) in 10 seconds. If the saturated suction temperature is less than the Brine Freeze Point (**Set Points→FRZ →BR.FZ**) minus 6° F (3.4° C) and less than the leaving fluid temperature minus 14° F (7.8° C) for 2 minutes, a stage of capacity will be removed from the circuit. Or, If the saturated suction temperature is less than the Brine Freeze Point minus 14° F (7.8° C), for 90 seconds, a stage of capacity will be removed from the circuit. The control will continue to decrease capacity as long as either condition exists.
09	SLOW CHANGE OVERRIDE	Slow change override is in effect. The leaving fluid temperature is close to and moving towards the control point.
10	MINIMUM OFF TIME ACTIVE	Chiller is being held off by Minutes Off Time (**Configuration→OPT2→DELY**).
13	DUAL SETPOINT	Dual Set Point mode is in effect. Chiller controls to Cooling Set Point 1 (**Set Points→COOL →CSP.1**) during occupied periods and Cooling Set Point 2 (**Set Points →COOL→CSP.2**) during unoccupied periods.
14	TEMPERATURE RESET	Temperature reset is in effect. In this mode, chiller is using temperature reset to adjust leaving fluid set point upward and is currently controlling to the modified set point. The set point can be modified based on return fluid, outdoor-air-temperature, space temperature, or 4 to 20 mA signal.
15	DEMAND/SOUND LIMITED	Demand limit is in effect. This indicates that the capacity of the chiller is being limited by demand limit control option. Because of this limitation, the chiller may not be able to produce the desired leaving fluid temperature. Demand limit can be controlled by switch inputs or a 4 to 20 mA signal.
16	COOLER FREEZE PROTECTION	Cooler fluid temperatures are approaching the Freeze point (see Alarms and Alerts section for definition). The chiller will be shut down when either fluid temperature falls below the Freeze point.
17	LOW TEMPERATURE COOLING	Chiller is in Cooling mode and the rate of change of the leaving fluid is negative and decreasing faster than -0.5° F per minute. Error between leaving fluid and control point exceeds fixed amount. Control will automatically unload the chiller if necessary.
18	HIGH TEMPERATURE COOLING	Chiller is in Cooling mode and the rate of change of the leaving fluid is positive and increasing. Error between leaving fluid and control point exceeds fixed amount. Control will automatically load the chiller if necessary to better match the increasing load.
19	MAKING ICE	Chiller is in an unoccupied mode and is using Cooling Set Point 3 (**Set Points →COOL →CSP.3**) to make ice. The ice done input to the Energy Management Module (EMM) is open.
20	STORING ICE	Chiller is in an unoccupied mode and is controlling to Cooling Set Point 2 (**Set Points →COOL →CSP.2**). The ice done input to the Energy Management Module (EMM) is closed.
21	HIGH SCT CIRCUIT A	Chiller is in a Cooling mode and the Saturated Condensing Temperature (SCT) is greater than the calculated maximum limit. No additional stages of capacity will be added. Chiller capacity may be reduced if SCT continues to rise to avoid high-pressure switch trips by reducing condensing temperature.
22	HIGH SCT CIRCUIT B	Chiller is in a Cooling mode and the Saturated Condensing Temperature (SCT) is greater than the calculated maximum limit. No additional stages of capacity will be added. Chiller capacity may be reduced if SCT continues to rise to avoid high-pressure switch trips by reducing condensing temperature.
23	MINIMUM COMP ON TIME	Cooling load may be satisfied, however control continues to operate compressor to ensure proper oil return. May be an indication of oversized application, low fluid flow rate or low loop volume.
24	PUMP OFF DELAY TIME	Cooling load is satisfied, however cooler pump continues to run for the number of minutes set by the configuration variable Cooler Pump Shutdown Delay (**Configuration→OPT1 →PM.DY**).
25	LOW SOUND MODE	Chiller operates at higher condensing temperature and/or reduced capacity to minimize overall unit noise during evening/night hours (**Configuration→OPT2→LS.MD**).

CONTROLS

General — The 30RAP air-cooled scroll chillers contain the *Comfort*Link™ electronic control system that controls and monitors all operations of the chiller.

The control system is composed of several components as listed in the sections below. See Fig. 3-5 for typical control box drawings. See Fig. 6 and 7 for control schematics.

Main Base Board (MBB) — See Fig. 8. The MBB is the heart of the *Comfort*Link control system. It contains the major portion of operating software and controls the operation of the machine. The MBB continuously monitors input/output channel information received from its inputs and from all other modules. The MBB receives inputs from the discharge and suction pressure transducers and thermistors. See Table 15. The MBB also receives the feedback inputs from each compressor current sensor board and other status switches. See Table 16. The MBB also controls several outputs. Relay outputs controlled by the MBB are shown in Table 17. Information is transmitted between modules via a 3-wire communication bus or LEN (Local Equipment Network). The CCN (Carrier Comfort Network) bus is also supported. Connections to both LEN and CCN buses are made at the LVT (low voltage terminal). See Fig. 8.

Energy Management Module (EMM) — The EMM module is available as a factory-installed option or as a field-installed accessory. The EMM module receives 4 to 20 mA inputs for the leaving fluid temperature reset, cooling set point and demand limit functions. The EMM module also receives the switch inputs for the field-installed 2-stage demand limit and ice done functions. The EMM module communicates the status of all inputs with the MBB, and the MBB adjusts the control point, capacity limit, and other functions according to the inputs received.

Current Sensor Board (CSB) — The CSB is used to monitor the status of the compressors by measuring current and providing an analog input to the main base board (MBB) or compressor expansion module (CXB).

AUX Board (AUX) — The AUX is used with the digital scroll option and the low ambient head pressure option. It provides additional inputs and outputs for digital scroll control along with analog outputs to control head pressure control fan speeds.

Expansion Valve Board (EXV) — The EXV board communicates with the MBB and directly controls the expansion valves to maintain the correct compressor superheat.

Enable/Off/Remote Contact Switch — The Enable/Off/Remote Contact switch is a 3-position switch used to control the chiller. When switched to the Enable position the chiller is under its own control. Move the switch to the Off position to shut the chiller down. Move the switch to the Remote Contact position and a field-installed dry contact can be used to start the chiller. The contacts must be capable of handling a 24 vac, 50-mA load. In the Enable and Remote Contact (dry contacts closed) positions, the chiller is allowed to operate and respond to the scheduling configuration, CCN configuration and set point data. See Fig. 9.

Emergency On/Off Switch — The Emergency On/Off switch should only be used when it is required to shut the chiller off immediately. Power to the MBB, EMM, and marquee display is interrupted when this switch is off and all outputs from these modules will be turned off.

Board Addresses — The main base board (MBB) has a 3-position instance jumper that must be set to '1.' The electronic expansion valve board (EXV) and energy management board (EMM) have 4-position DIP switches. All switches are set to 'On' for these boards. The auxiliary board (AUX) has an 8-position DIP switch. Switches 2, 5, and 7 are set to 'On.'

Control Module Communication

RED LED — Proper operation of the control boards can be visually checked by looking at the red status LEDs (light-emitting diodes). When operating correctly, the red status LEDs should be blinking in unison at a rate of once every 2 seconds. If the red LEDs are not blinking in unison, verify that correct power is being supplied to all modules. Be sure that the main base board (MBB) is supplied with the current software. If necessary, reload current software. If the problem still persists, replace the MBB. A red LED that is lit continuously or blinking at a rate of once per second or faster indicates that the board should be replaced.

GREEN LED — The MBB has one green LED. The Local Equipment Network (LEN) LED should always be blinking whenever power is on. All other boards have a LEN LED which should be blinking whenever power is on. Check LEN connections for potential communication errors at the board J3 and/or J4 connectors. Communication between modules is accomplished by a 3-wire sensor bus. These 3 wires run in parallel from module to module. The J4 connector on the MBB provides both power and communication directly to the marquee display only.

YELLOW LED — The MBB has one yellow LED. The Carrier Comfort Network (CCN) LED will blink during times of network communication.

Carrier Comfort Network® (CCN) Interface —

The 30RAP chiller units can be connected to the CCN if desired. The communication bus wiring is a shielded, 3-conductor cable with drain wire and is supplied and installed in the field. See Table 18. The system elements are connected to the communication bus in a daisy chain arrangement. The positive pin of each system element communication connector must be wired to the positive pins of the system elements on either side of it. This is also required for the negative and signal ground pins of each system element. Wiring connections for CCN should be made at LVT. Consult the CCN Contractor's Manual for further information.

NOTE: Conductors and drain wire must be 20 AWG (American Wire Gage) minimum stranded, tinned copper. Individual conductors must be insulated with PVC, PVC/nylon, vinyl, Teflon, or polyethylene. An aluminum/polyester 100% foil shield and an outer jacket of PVC, PVC/nylon, chrome vinyl, or Teflon with a minimum operating temperature range of –20 C to 60 C is required. Wire manufactured by Alpha (2413 or 5463), American (A22503), Belden (8772), or Columbia (02525) meets the above mentioned requirements.

It is important when connecting to a CCN communication bus that a color coding scheme be used for the entire network to simplify the installation. It is recommended that red be used for the signal positive, black for the signal negative, and white for the signal ground. Use a similar scheme for cables containing different colored wires.

At each system element, the shields of its communication bus cables must be tied together. If the communication bus is entirely within one building, the resulting continuous shield must be connected to a ground at one point only. If the communication bus cable exits from one building and enters another, the shields must be connected to grounds at the lightning suppressor in each building where the cable enters or exits the building (one point per building only). To connect the unit to the network:

1. Turn off power to the control box.

2. Cut the CCN wire and strip the ends of the red (+), white (ground), and black (–) conductors. (Substitute appropriate colors for different colored cables.)

3. Connect the red wire to (+) terminal on LVT of the plug, the white wire to COM terminal, and the black wire to the (–) terminal.

4. The RJ14 CCN connector on LVT can also be used, but is only intended for temporary connection (for example, a laptop computer running Service Tool).

IMPORTANT: A shorted CCN bus cable will prevent some routines from running and may prevent the unit from starting. If abnormal conditions occur, unplug the connector. If conditions return to normal, check the CCN connector and cable. Run new cable if necessary. A short in one section of the bus can cause problems with all system elements on the bus.

Table 15 — Thermistor Designations

THERMISTOR	PIN CONNECTION POINT	THERMISTOR INPUT
LWT	J8-13,14 (MBB)	Cooler Leaving Fluid
EWT	J8-11,12 (MBB)	Cooler Entering Fluid
RGTA	J8-1,2 (MBB)	Circuit A Return Gas Temperature
RGTB	J8-3,4 (MBB)	Circuit B (035-060 only) Return Gas Temperature
OAT	J8-7,8 (MBB)	Outdoor-Air Temperature Sensor
SPT	J8-5,6 (MBB) TB5-5,6	Accessory Remote Space Temperature Sensor or Dual LWT Sensor
DTT	J6-1,2 (AUX)	Discharge Temperature Thermistor

LEGEND

LWT — Leaving Water Temperature
MBB — Main Base Board

Table 16 — Status Inputs

STATUS SWITCH	PIN CONNECTION POINT
Chilled Water Pump 1	J7-1,2
Chilled Water Pump 2	J7-3,4
Remote On/Off	LVT-13,14
Cooler Flow Switch	J7-9,10
Compressor Fault Signal, A1	J9-11,12
Compressor Fault Signal, A2	J9-5,6
Compressor Fault Signal, B1	J9-8,9
Compressor Fault Signal, B2	J9-2,3

Table 17 — Output Relays

RELAY NO.	DESCRIPTION
K1	Energize Compressor A1 (010-030) Energize Compressor A1 and Condenser Fan Contactor 3 (055,060)
K2	Energize Compressor A2 (all but 010, 015 60 Hz)
K3	Energize Chilled Water Pump 1 Output
K4	Energize Chilled Water Pump 2 Output
K5	Energize Compressor B1 (035-050) Energize Compressor B1 and Condenser Fan Contactor 3 (055,060)
K6	Energize Compressor B2 (035-060)
K7	Alarm Relay
K8	Cooler/Pump Heater
K9	Energize Condenser Fan Contactor 1 (018-060)
K10	Energize Condenser Fan Contactor 2 (018-060)
K11	Minimum Load Valve

Table 18 — CCN Communication Bus Wiring

MANUFACTURER	PART NO.	
	Regular Wiring	Plenum Wiring
Alpha	1895	—
American	A21451	A48301
Belden	8205	884421
Columbia	D6451	—
Manhattan	M13402	M64430
Quabik	6130	—

Sensors — The electronic control uses 4 to 7 thermistors to sense temperatures for controlling chiller operation. See Table 15. These sensors are outlined below. Thermistors RGTA, RGTB, EWT, LWT, and OAT are identical in temperature versus resistance and voltage drop performance. The dual chiller thermistor is 5 kΩ at 77 F (25 C) thermistor. Space temperature thermistor is a 10 kΩ at 77 F (25 C). The DTT thermistor is an 86 kΩ at 77 F (25 C) thermistor. See Thermistors section for temperature-resistance-voltage drop characteristics.

COOLER LEAVING FLUID SENSOR — The thermistor is installed in a well in the factory-installed leaving fluid piping coming from the bottom of the brazed-plate heat exchanger.

COOLER ENTERING FLUID SENSOR — The thermistor is installed in a well in the factory-installed entering fluid piping coming from the top of the brazed-plate heat exchanger.

COMPRESSOR RETURN GAS TEMPERATURE SENSOR — These thermistors are installed in a well located in the suction line of each circuit.

OUTDOOR-AIR TEMPERATURE SENSOR (OAT) — This sensor is factory installed on a bracket which is inserted through the base pan of the unit.

DISCHARGE TEMPERATURE THERMISTOR (DTT) — This sensor is only used on units with a digital compressor. The sensor is mounted on the discharge line close to the discharge of the digital compressor. It attaches to the discharge line using a spring clip and protects the system from high discharge gas temperature when the digital compressor is used. This sensor is a connected to the AUX board.

REMOTE SPACE TEMPERATURE SENSOR OR DUAL LEAVING WATER TEMPERATURE SENSOR — One of two inputs can be connected to the LVT. See appropriate sensor below.

Remote Space Temperature Sensor — Sensor (part no. 33ZCT55SPT) is an accessory sensor that is remotely mounted in the controlled space and used for space temperature reset. The sensor should be installed as a wall-mounted thermostat would be (in the conditioned space where it will not be subjected to either a cooling or heating source or direct exposure to sunlight, and 4 to 5 ft above the floor).

Space temperature sensor wires are to be connected to terminals in the unit main control box. The space temperature sensor includes a terminal block (SEN) and a RJ11 female connector. The RJ11 connector is used access into the Carrier Comfort Network® (CCN) at the sensor.

To connect the space temperature sensor (Fig. 10):

1. Using a 20 AWG twisted pair conductor cable rated for the application, connect 1 wire of the twisted pair to one SEN terminal and connect the other wire to the other SEN terminal located under the cover of the space temperature sensor.

2. Connect the other ends of the wires to terminals 5 and 6 on TB5 located in the unit control box.

Units on the CCN can be monitored from the space at the sensor through the RJ11 connector, if desired. To wire the RJ11 connector into the CCN (Fig. 11):

IMPORTANT: The cable selected for the RJ11 connector wiring MUST be identical to the CCN communication bus wire used for the entire network. Refer to Table 18 for acceptable wiring.

1. Cut the CCN wire and strip ends of the red (+), white (ground), and black (–) conductors. (If another wire color scheme is used, strip ends of appropriate wires.)
2. Insert and secure the red (+) wire to terminal 5 of the space temperature sensor terminal block.
3. Insert and secure the white (ground) wire to terminal 4 of the space temperature sensor.
4. Insert and secure the black (–) wire to terminal 2 of the space temperature sensor.
5. Connect the other end of the communication bus cable to the remainder of the CCN communication bus.

Dual Leaving Water Temperature Sensor — For dual chiller applications (parallel only are supported), connect the dual chiller leaving fluid temperature sensor (refer to Configuring and Operating Dual Chiller Control section on page 36) to the space temperature input of the Master chiller. If space temperature is required for reset applications, connect the sensor to the Slave chiller and configure the slave chiller to broadcast the value to the Master chiller.

LEGEND FOR FIG. 3-7

ALMR — Alarm Relay
AUX — Auxilliary
BR — Boiler Relay
C — Contactor, Compressor
CB — Circuit Breaker
CCB — Compressor Circuit Breaker
CH — Crankcase Heater
CHC — Cooler/Pump Heater Contactor
COMP — Compressor
CSB — Current Sensor Board
CWFS — Chilled Water Flow Switch
CWP — Chilled Water Pump
DGS — Digital Scroll Compressor
DPT — Discharge Pressure Transducer
DTT — Discharge Temperature Thermistor
DUS — Digital Unloader Solenoid
EMM — Energy Management
EXV — Electronic Expansion Valve
FB — Fuse Block
FC — Fan Contactor
FCB — Fan Circuit Breaker
FIOP — factory Installed Option
FR — Fan Relay
GND — Ground
HPS — High-Pressure Switch
LON — Local Operating Network
LVT — Low Voltage Terminal Block
MBB — Main Base Board
MLV — Minimum Load Valve
MM — Motormaster
MP — Motor Protector
MS — Manual Starter
NEC — National Electrical Code
OAT — Outdoor-Air Thermistor
OFM — Outdoor Fan Motor
RGT — Return Gas Thermistor
SCCR — Short Circuit Current Rating
SPT — Suction Pressure Transducer
SW — Switch
TB — Terminal Block
TNKR — Storage Tank Heater Relay
TRAN — Transformer
UPC — Unitary Protocol Converter

| x | Terminal Block

◯   Terminal (Unmarked)

⬡ x   Terminal (Marked)

●   Splice

———   Factory Wiring

– – – –   Field Wiring

—--—--   Accessory or Option Wiring

▬▬▬   To indicate common potential only; not to represent wiring.
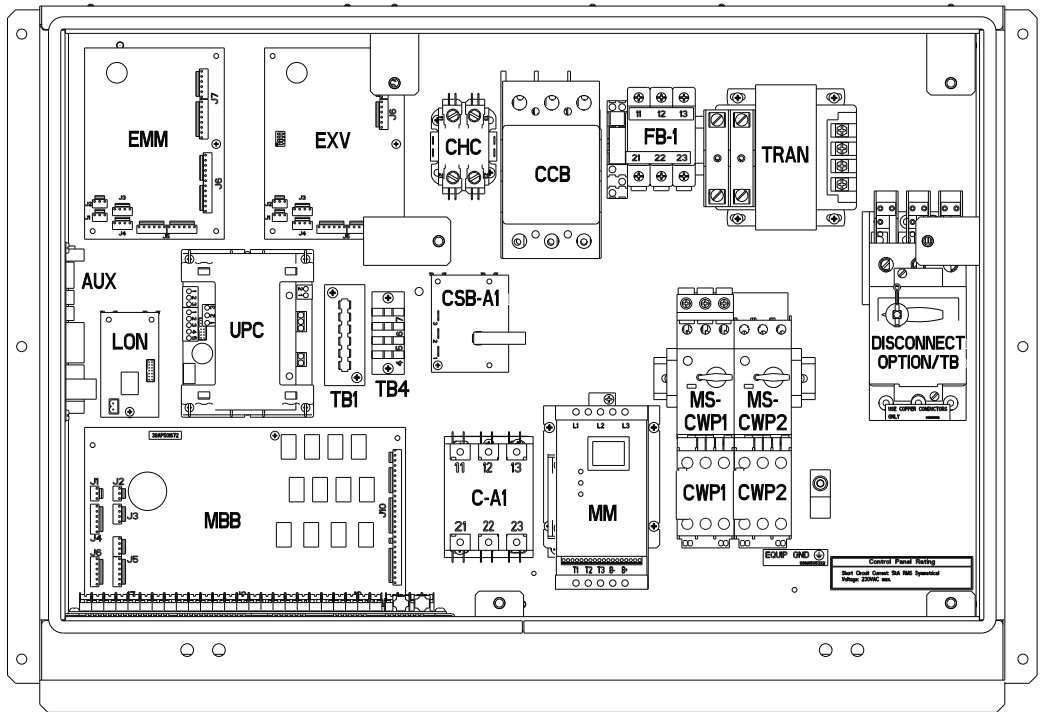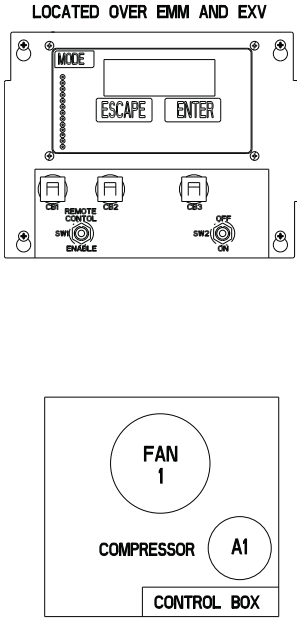
Fig. 3 — Typical Control Box for 30RAP010,015
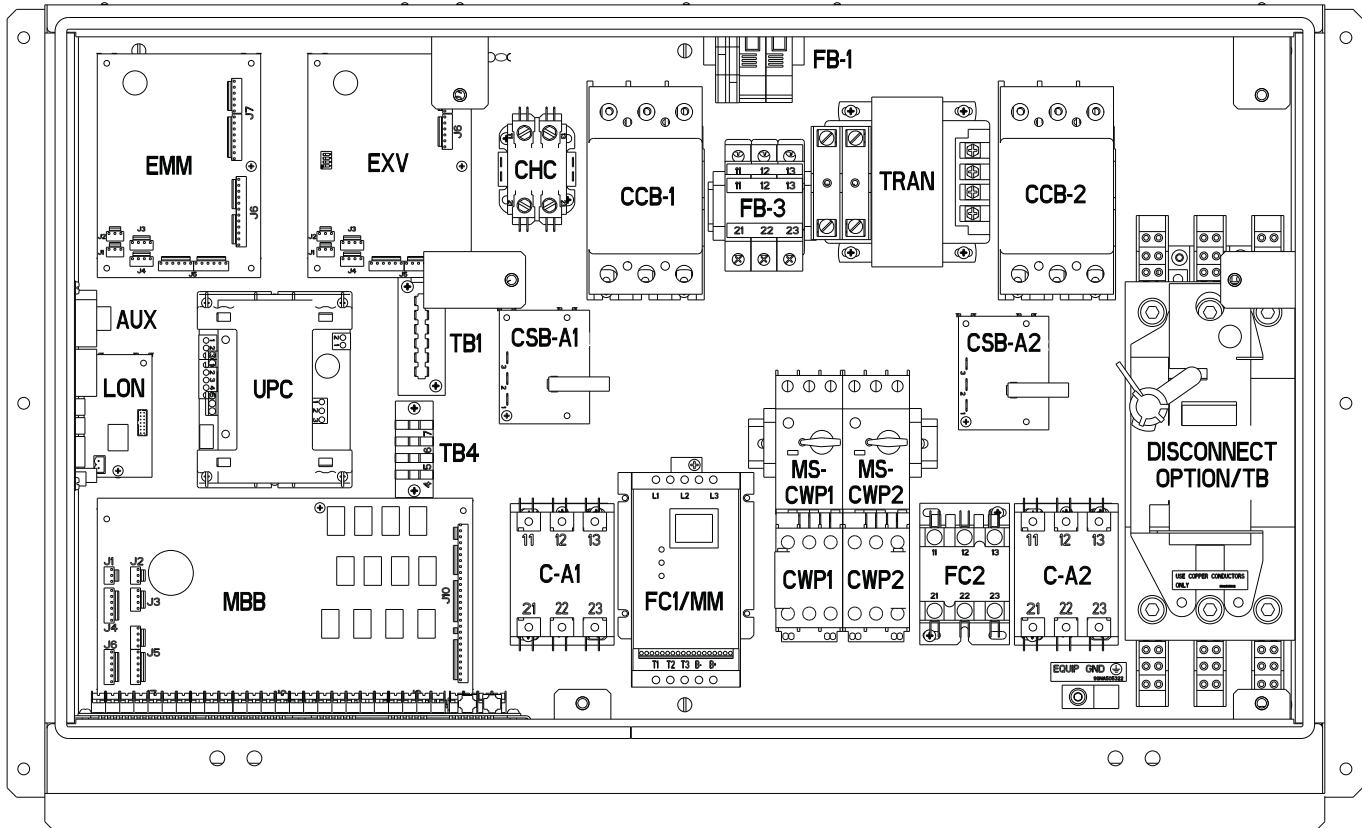
Fig. 4 — Typical Control Box for 30RAP018-030

22
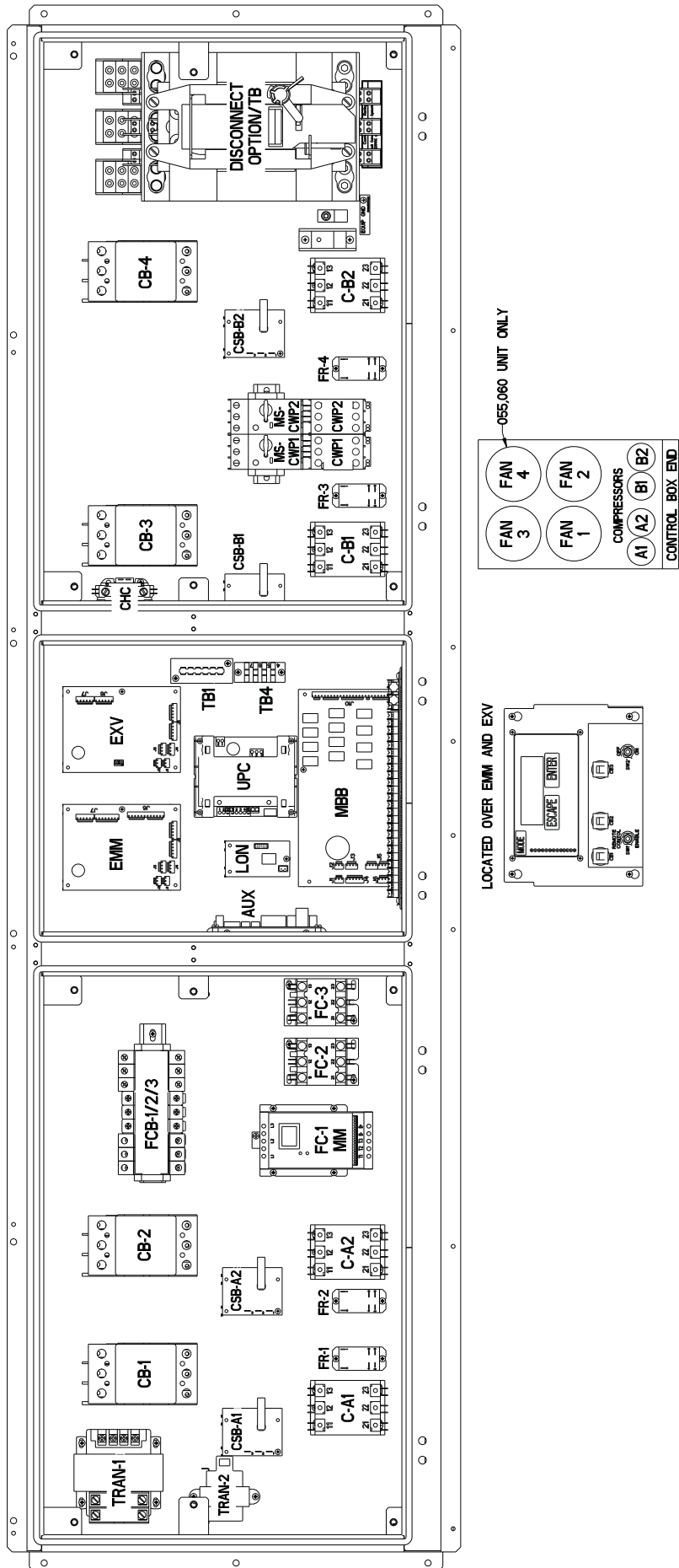
Fig. 5 — Typical Control Box for 30RAP035-060
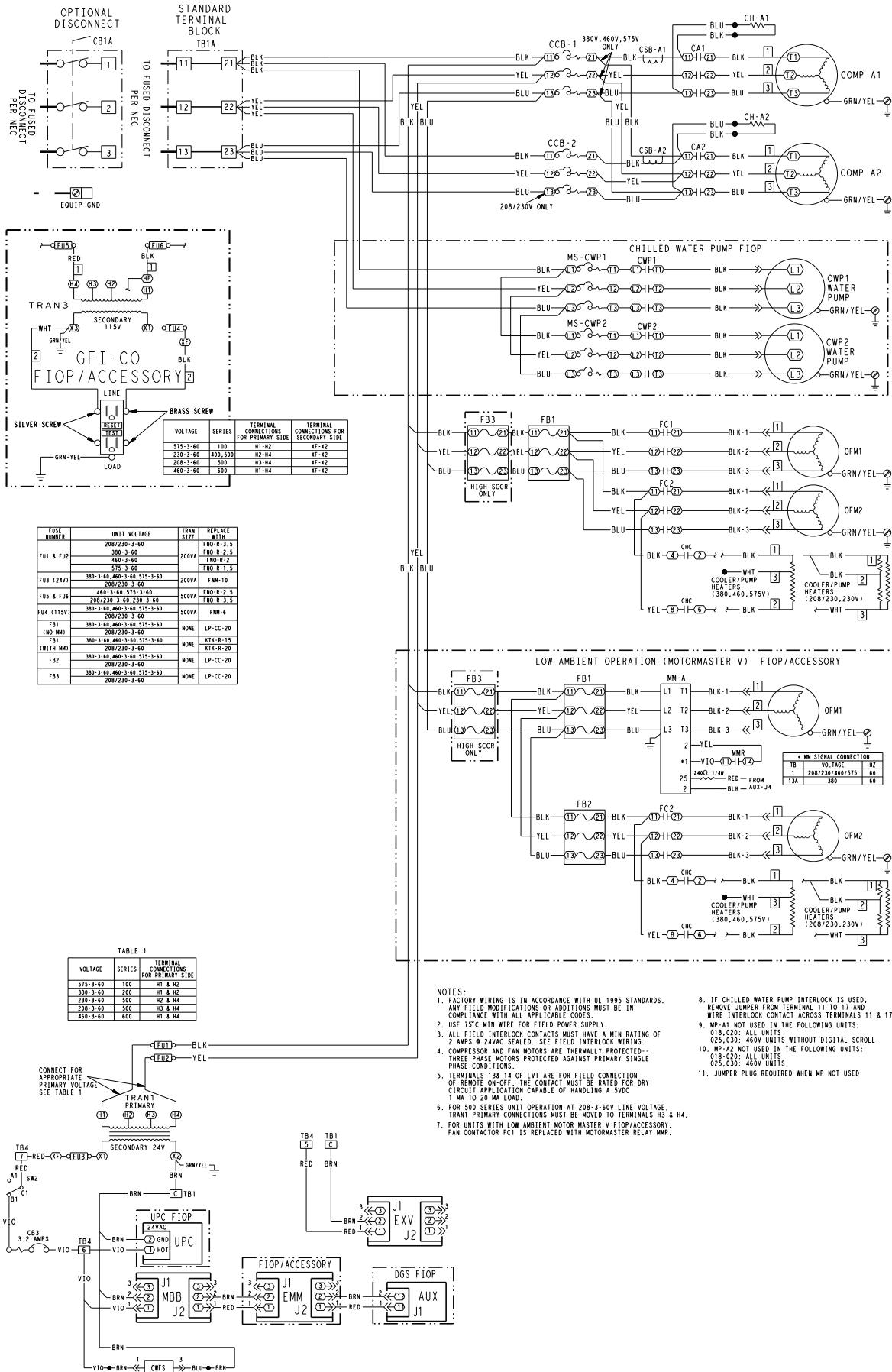
Fig. 6A — Typical Wiring Schematic, 30RAP018-030 Units — Power Wiring
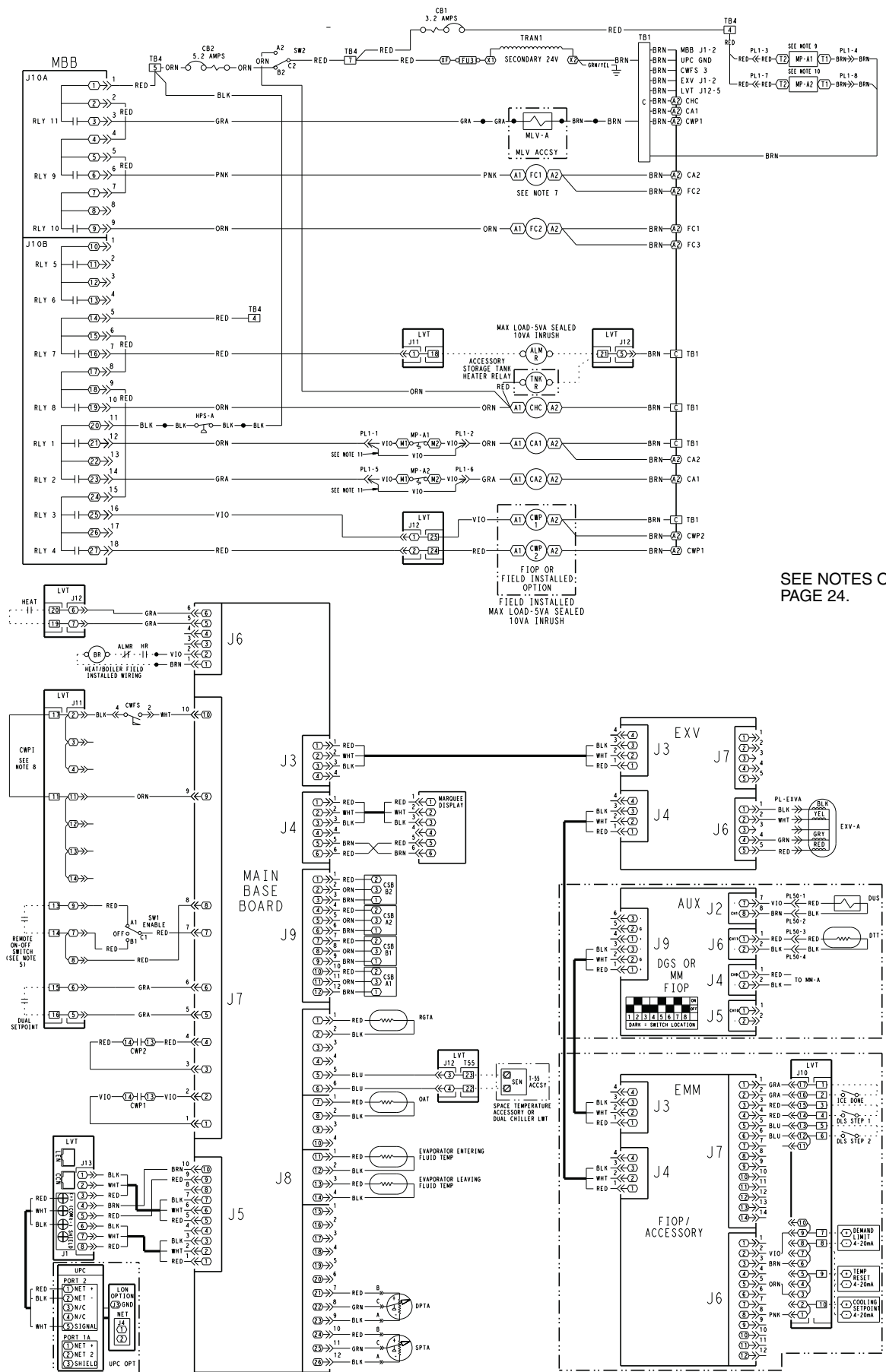
Fig. 6B — Typical Wiring Schematic, 30RAP018-030 Units — Control Wiring

SEE NOTES ON PAGE 24.

Fig. 7A — Typical Wiring Schematic, 30RAP035-060 Units — Power Wiring
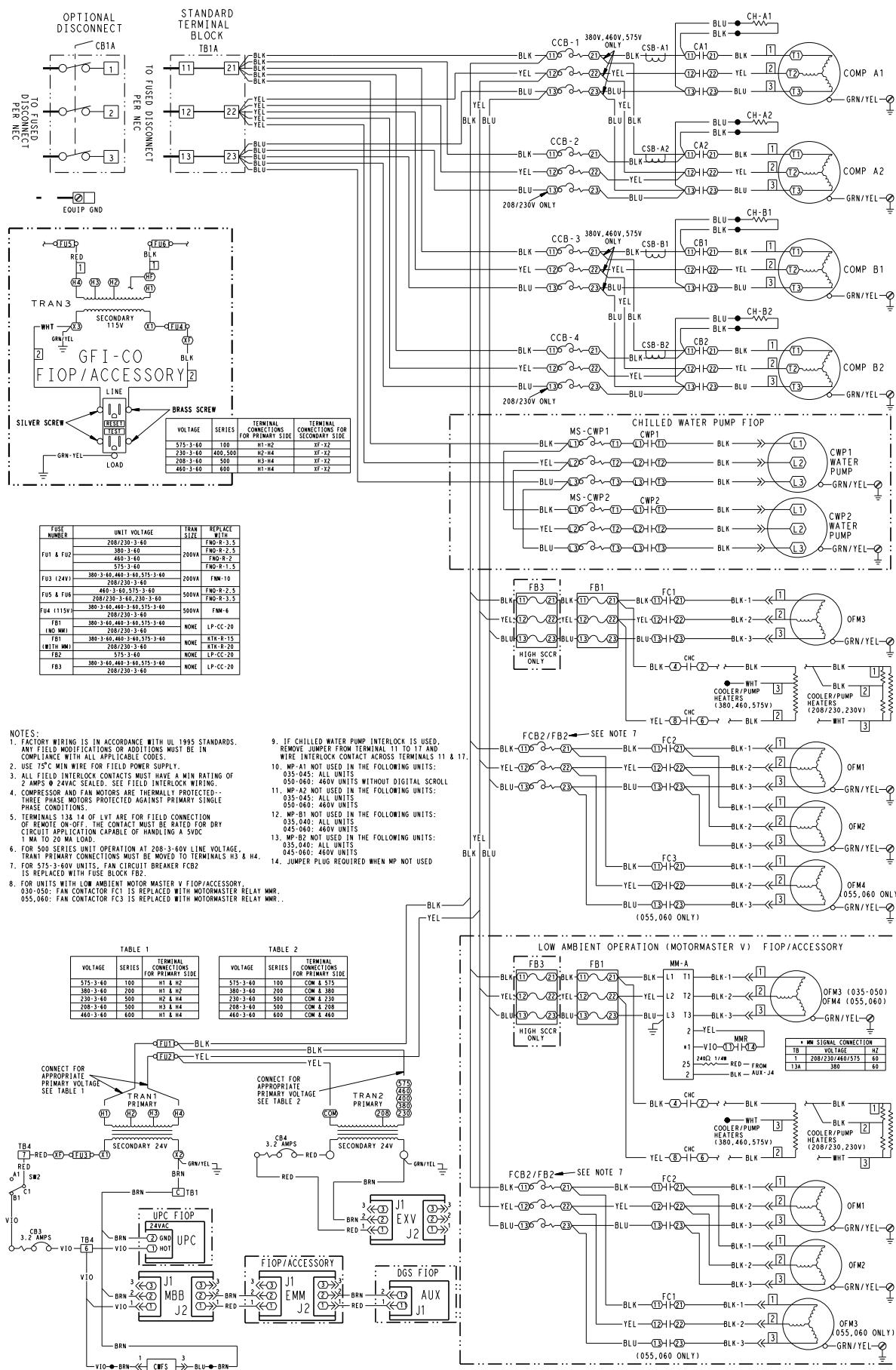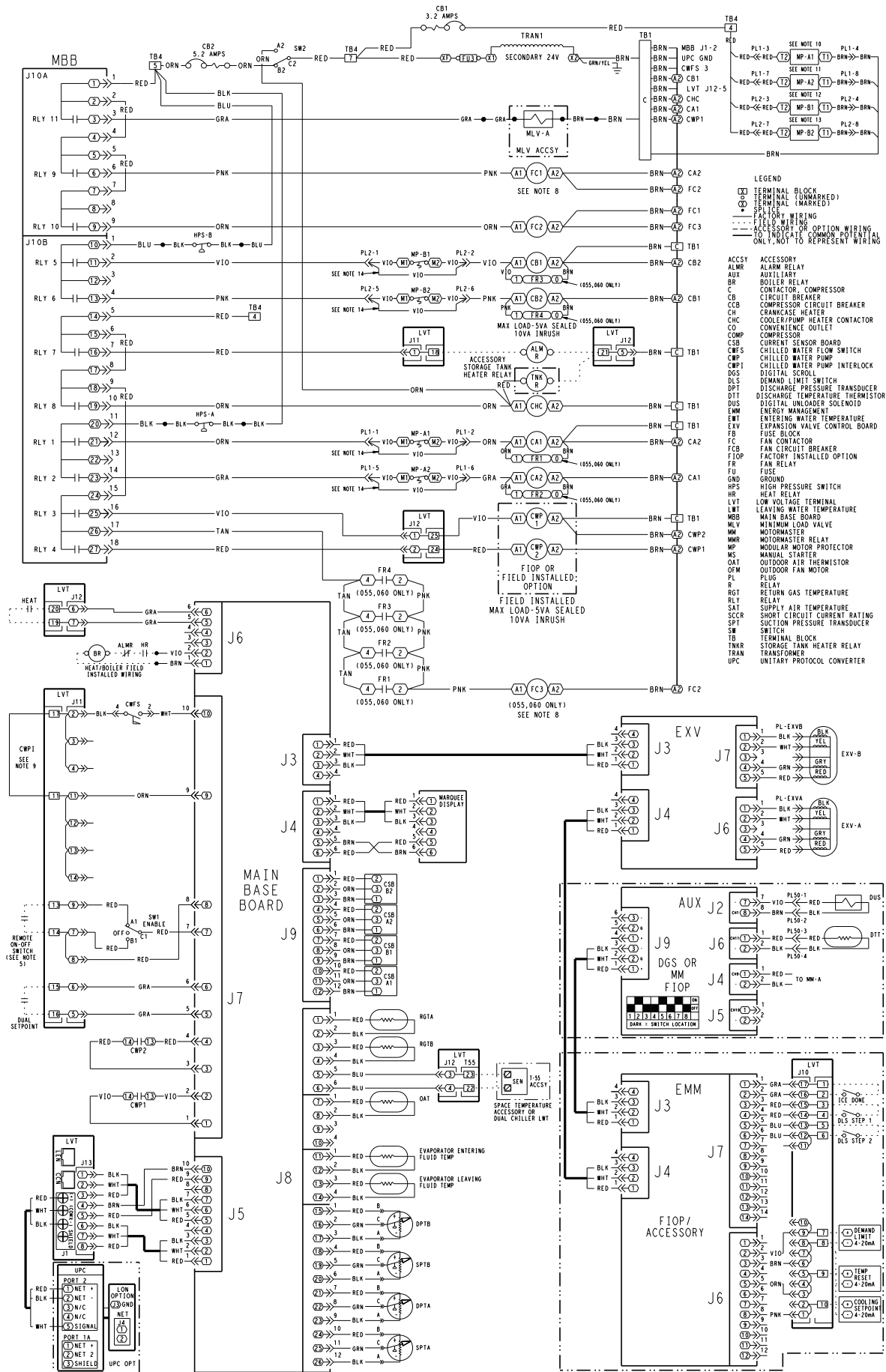
Fig. 7B — Typical Wiring Schematic, 30RAP035-060 Units — Control Wiring

RED LED - STATUS

GREEN LED -
LEN (LOCAL EQUIPMENT NETWORK)

YELLOW LED -
CCN (CARRIER COMFORT NETWORK)

INSTANCE JUMPER

CEPL130346-01
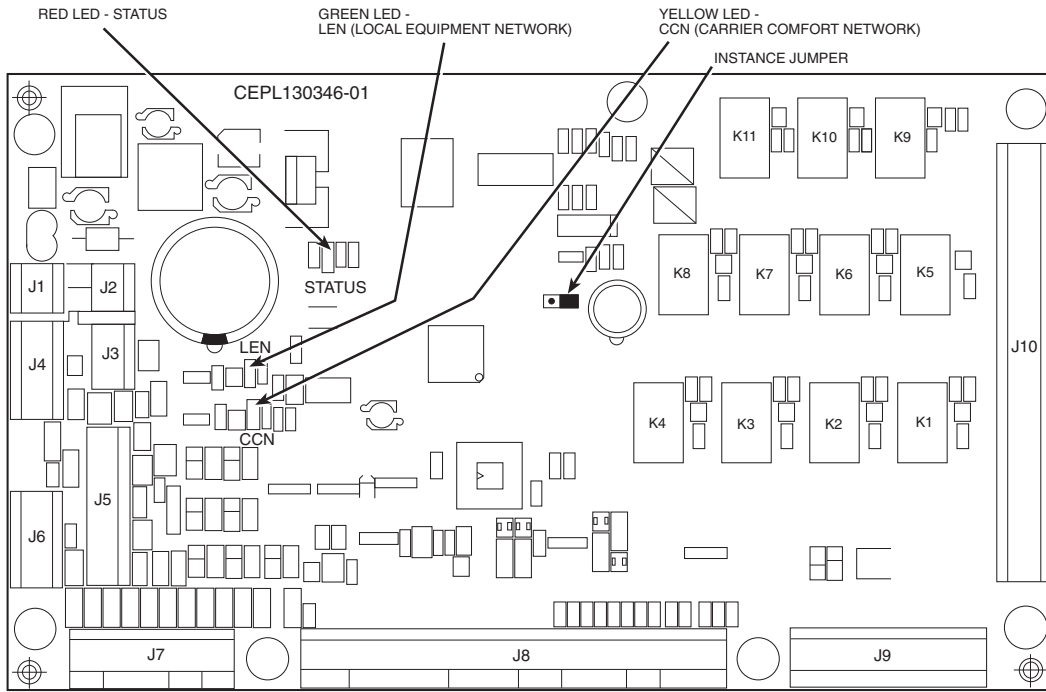
Fig. 8 — Main Base Board
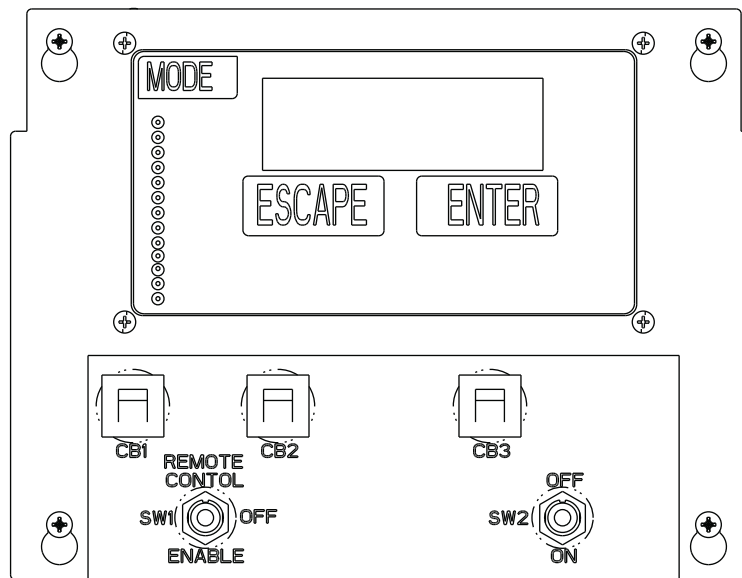
Fig. 9 — Enable/Off/Remote Contact Switch, and Emergency On/Off Switch Locations

SPT (T10) PART NO. 33ZCT55SPT
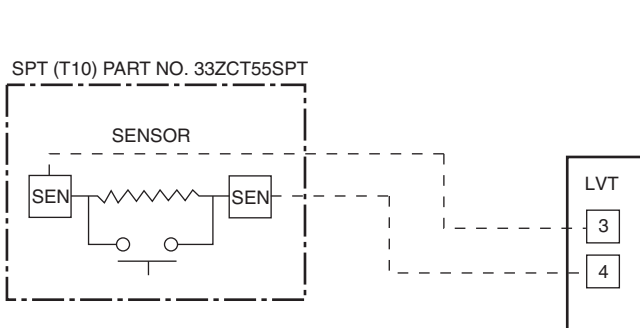
SENSOR

**Fig. 10 — Typical Space Temperature
Sensor Wiring**

T-55 SPACE
SENSOR

TO CCN
COMM 1
BUS (PLUG)
AT UNIT

CCN+
CCN GND
CCN-

**Fig. 11 — CCN Communications Bus Wiring
to Optional Space Sensor RJ11 Connector**

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Energy Management Module (Fig. 12) — This factory-installed option (FIOP) or field-installed accessory is used for the following types of temperature reset, demand limit, and/or ice features:

- 4 to 20 mA leaving fluid temperature reset (requires field-supplied 4 to 20 mA generator)
- 4 to 20 mA cooling set point reset (requires field-supplied 4 to 20 mA generator)
- Discrete inputs for 2-step demand limit (requires field-supplied dry contacts capable of handling a 24 vac, 50 mA load)
- 4 to 20 mA demand limit (requires field-supplied 4 to 20 mA generator)
- Discrete input for Ice Done switch (requires field-supplied dry contacts capable of handling a 24 vac, 50 mA load)

See Demand Limit and Temperature Reset sections on pages 41 and 37 for further details.

⚠ CAUTION

Care should be taken when interfacing with other manufacturer's control systems due to possible power supply differences, full wave bridge versus half wave rectification. The two different power supplies cannot be mixed. *Comfort*Link™ controls use half wave rectification. A signal isolation device should be utilized if a full wave bridge signal generating device is used.

Loss-of-Cooler Flow Protection — A proof-of-cooler flow device is factory installed in all chillers. It is recommended that proper operation of the switch be verified on a regular basis.

Electronic Expansion Valves (EXV) — All units are equipped from the factory with EXVs. Each refrigeration circuit is also supplied with a factory-installed liquid line filter drier and sight glass.

The EXV is set at the factory to maintain 9° F (5.0° C) suction superheat leaving the cooler by metering the proper amount of refrigerant into the cooler. The superheat set point is adjustable, *but should not be adjusted unless absolutely necessary.*

The EXV is designed to limit the cooler saturated suction temperature to 50 F (12.8 C). This makes it possible for unit to start at high cooler fluid temperatures without overloading the compressor.

Capacity Control — The control system cycles compressors, digital scroll modulting solenoid (if equipped), and minimum load valve solenoids (if equipped) to maintain the user-configured leaving chilled fluid temperature set point. Entering fluid temperature is used by the main base board (MBB) to determine the temperature drop across the cooler and is used in determining the optimum time to add or subtract capacity stages. The chilled fluid temperature set point can be automatically reset by the return fluid temperature, space, or outdoor-air temperature reset features. It can also be reset from an external 4 to 20-mA signal (requires energy management module FIOP or accessory).

The standard control has an automatic lead-lag feature built in which determines the wear factor (combination of starts and run hours) for each compressor. If all compressors are off and less than 30 minutes has elapsed since the last compressor was turned off, the wear factor is used to determine which compressor to start next. If no compressors have been running for more than 30 minutes and the leaving fluid temperature is greater than the saturated condensing temperature, the wear factor is still used to determine which compressor to start next. If the leaving fluid temperature is less than the saturated condensing temperature, then the control will start either compressor A1 or compressor B1 first, depending on the user-configurable circuit lead-lag value. For units with the minimum load control valve, the A circuit with the minimum load valve is always the lead circuit. The A circuit is also always the lead for units with the digital compressor option. On units with the digital scroll option, the A1 compressor operates continuously, providing close leaving chilled water control. For this reason, on/off cycling of the unit's compressors is dramatically reduced, which in turn reduces wear associated with compressor start/stop cycles.

The EXVs will provide a controlled start-up. During start-up, the low pressure logic will be bypassed for $2^{1}/_{2}$ minutes to allow for the transient changes during start-up. As additional stages of compression are required, the processor control will add them. See Table 19.

If a circuit is to be stopped, the compressor with the lowest wear factor will be shut off first except when a digital compressor is used. The digital compressor is always the last compressor to shut off.

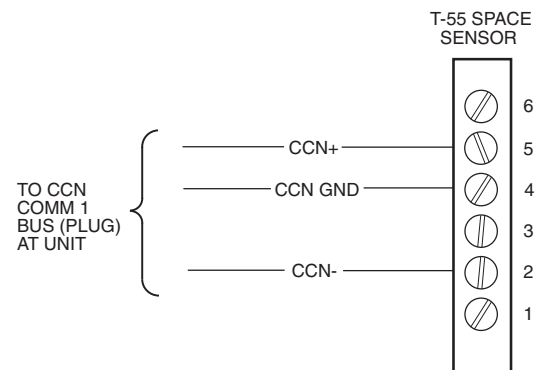The capacity control algorithm runs every 30 seconds. The algorithm attempts to maintain the Control Point at the desired set point. Each time it runs, the control reads the entering and leaving fluid temperatures. The control determines the rate at which conditions are changing and calculates 2 variables based on these conditions. Next, a capacity ratio is calculated using the 2 variables to determine whether or not to make any changes to the current stages of capacity. This ratio value ranges from –100 to +100%. If the next stage of capacity is a compressor, the control starts (stops) a compressor when the ratio reaches +100% (–100%). If installed, the minimum load valve solenoid will be energized with the first stage of capacity. Minimum load valve value is a fixed 30% in the total capacity calculation. The control will also use the minimum load valve solenoid as the last stage of capacity before turning off the last compressor. A delay of 90 seconds occurs after each capacity step change. Refer to Table 19.

MINUTES LEFT FOR START — This value is displayed only in the network display tables (using Service Tool, ComfortVIEW™ or ComfortWORKS® software) and represents the amount of time to elapse before the unit will start its initialization routine. This value can be zero without the machine running in many situations. This can include being unoccupied, ENABLE/OFF/REMOTE CONTACT switch in the OFF position, CCN not allowing unit to start, Demand Limit in effect, no call for cooling due to no load, and alarm or alert conditions present. If the machine should be running and none of the above are true, a minimum off time (DELY, see below) may be in effect. The machine should start normally once the time limit has expired.

MINUTES OFF TIME (*Configuration→OPT2→ DELY*) — This user-configurable time period is used by the control to determine how long unit operation is delayed after power is applied/restored to the unit. Typically, this time period is configured when multiple machines are located on a single site. For example, this gives the user the ability to prevent all the units from restarting at once after a power failure. A value of zero for this variable does not mean that the unit should be running.

RED LED - STATUS

GREEN LED -
LEN (LOCAL EQUIPMENT NETWORK)

ADDRESS
DIP SWITCH
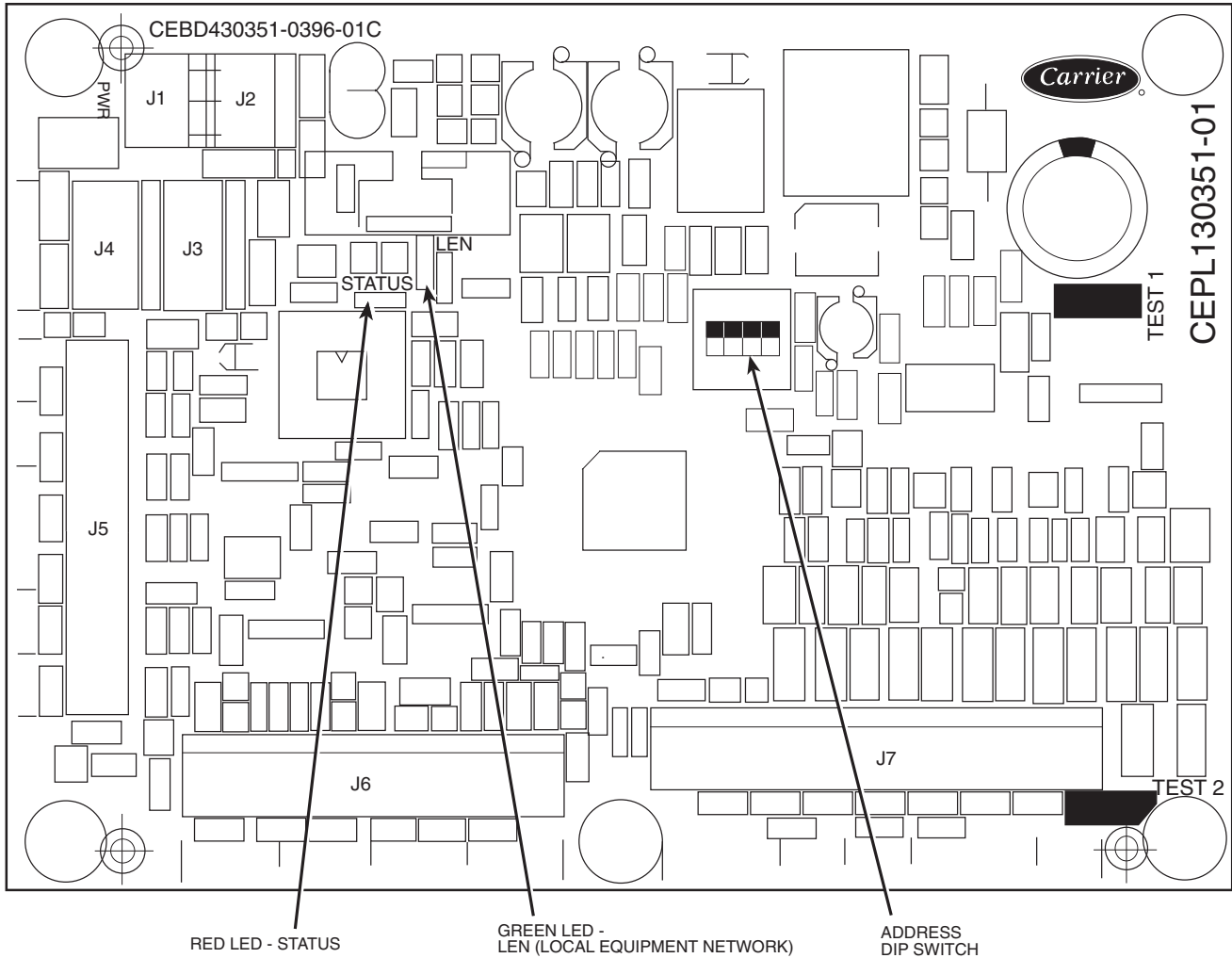
Fig. 12 — Energy Management Module

LEAD/LAG DETERMINATION — This is a configurable choice and is factory set to be automatic for all units unless the unit is equipped with a digital scroll compressor or minimum load, then circuit A is lead (*Configuration→OPT2→LLCS*). The value can be changed to Circuit A or Circuit B leading as desired. Set at automatic, the control will sum the current number of logged circuit starts and one-quarter of the current operating hours for each circuit. The circuit with the lowest sum is started first. Changes to which circuit is the lead circuit and which is the lag are also made when total machine capacity is at 100% or when there is a change in the direction of capacity (increase or decrease) and each circuit's capacity is equal.

CAPACITY CONTROL OVERRIDES — The following overrides will modify the normal operation of the routine.

Deadband Multiplier — The user configurable Deadband Multiplier (*Configuration→SLCT→Z.GN*) has a default value of 1.0. The range is from 1.0 to 4.0. When set to other than 1.0, this factor is applied to the capacity Load/Unload Factor. The larger this value is set, the longer the control will delay between adding or removing stages of capacity. Figure 13 shows how compressor starts can be reduced over time if the leaving water temperature is allowed to drift a larger amount above and below the set point. This value should be set in the range of 3.0 to 4.0 for systems with small loop volumes.

First Stage Override — If the current capacity stage is zero, the control will modify the routine with a 1.2 factor on adding the first stage to reduce cycling. This factor is also applied

when the control is attempting to remove the last stage of capacity.

Slow Change Override — The control prevents the capacity stages from being changed when the leaving fluid temperature is close to the set point (within an adjustable deadband) and moving towards the set point.

Ramp Loading — Ramp loading (*Configuration→SLCT→CRMP*) limits the rate of change of leaving fluid temperature. If the unit is in a Cooling mode and configured for Ramp Loading, the control makes 2 comparisons before deciding to change stages of capacity. The control calculates a temperature difference between the control point and leaving fluid temperature. If the difference is greater than 4° F (2.2° C) and the rate of change (°F or °C per minute) is more than the configured Cooling Ramp Loading value (*CRMP*), the control does not allow any changes to the current stage of capacity.

Low Entering Fluid Temperature Unloading — When the entering fluid temperature is below the control point, the control will attempt to remove 25% of the current stages being used. If exactly 25% cannot be removed, the control removes an amount greater than 25% but no more than necessary. The lowest stage will not be removed.

Minimum Load Control — If equipped, the minimum load control valve is energized only when one compressor is running on circuit A. If the close control feature is enabled the minimum load control valve may be used as needed to obtain leaving fluid temperature close to set point.

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Table 19 — Part Load Data Percent Displacement, Standard Units with Minimum Load Valve

30RAP UNIT SIZE	CONTROL STEPS	CAPACITY STEPS	CAPACITY %	
		% Displacement	Circuit A	Circuit B
010	1	100	100	—
015	1	100	100	—
018	1 2 3	100 50 20*	100	—
020	1 2 3	100 50 24*	100	—
025	1 2 3	100 50 29*	100	—
030	1 2 3	100 50 32*	100	—
035	1 2 3 4 5	100 77 50 23 9*	54	46
040	1 2 3 4 5	100 73 50 23 11*	47	53
045	1 2 3 4 5	100 74 50 24 12*	47	53
050	1 2 3 4 5	100 75 50 25 14*	50	50
055	1 2 3 4 5	100 73 50 23 13*	46	54
060	1 2 3 4 5	100 75 50 25 16*	50	50

*Minimum Load Valve energized.

NOTE: These capacity steps may vary due to different capacity staging sequences.

Fig. 13 — Deadband Multiplier

LEGEND
LWT — Leaving Water Temperature
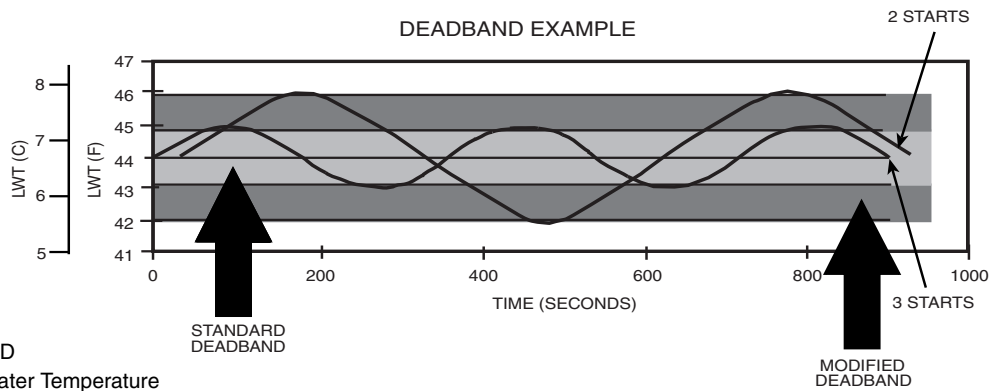
Cooler Freeze Protection — The control will try to prevent shutting the chiller down on a Cooler Freeze Protection alarm by removing stages of capacity. If the cooler fluid selected is Water, the freeze point is 34 F (1.1 C). If the cooler fluid selected is Brine, the freeze point is the Brine Freeze Point (*Set Points→FRZ→BR.FZ*). This alarm condition (A207) only references leaving fluid temperature and NOT Brine Freeze point. If the cooler leaving fluid temperature is less than the freeze point plus 2.0° F (1.1° C), the control will immediately remove one stage of capacity. This can be repeated once every 30 seconds.

Low Saturated Suction Protection — The control will try to prevent shutting a circuit down due to low saturated suction conditions by removing stages of capacity. These circuit alert conditions (T116, T117) compare saturated suction temperature to the configured Brine Freeze Point (*Set Points→FRZ→BR.FZ*). The Brine Freeze point is a user-configurable value that must be left at 34 F (1.1 C) for 100% water systems. A lower value may be entered for systems with brine solutions, but this value should be set according to the freeze protection level of the brine mixture. Failure to properly set this brine freeze point value may permanently damage the brazed plate heat exchanger. The control will initiate Mode 7 (Circuit A) or Mode 8 (Circuit B) to indicate a circuit's capacity is limited and that eventually the circuit may shut down.

Head Pressure Control — The main base board (MBB) controls the condenser fans to maintain the lowest condensing temperature possible, and thus the highest unit efficiency. The MBB uses the saturated condensing temperature input from the discharge pressure transducer and outside air temperature sensor to control the fans. If OAT is greater than 70 F before a circuit is starting, then all condenser fan stages will be energized. A fan stage is increased based on SCT (saturated condensing temperature). When the highest SCT is greater than the Fan On Set Point (*Set Points→HEAD→F.ON*), then an additional stage of fan will be added to the current fan stage. Fan On Set Point (*F.ON*) equals Head Set Point (*Set Points→HEAD→H.DP*) except after a fan stage increase when the Head Set Point is increased by Fan Stage Delta (*Set Points→HEAD→F.DLT*). A fan stage is decreased when the SCTs of both circuits are less than the Fan Off Set Point (*Set Points→HEAD →F.OFF*) for two minutes. Table 20 shows the number of fan stages, contactors energized and the fans that are on during the fan stage. Unit sizes 035 to 060 have common fan control. Figure 14 shows the location of each fan and compressor within the unit.

MOTORMASTER® V OPTION — Motormaster V is standard on 30RAP010 and 015 size units. For all other units that need low-ambient operation, the lead fan on a circuit can be equipped with the Motormaster V head pressure controller option or accessory. The controller is energized with the first fan stage and adjusts fan speed to maintain a SCT of 72 F (22.2 C). The first stage of fan operation is controlled by the Motormaster V controller. Refer to Fig. 15 for condenser fan layout information. The Motormaster is configured in the Motormaster Select (*Configuration→MM→MMR.S*)

Operation of Machine Based on Control Method and Cooling Set Point Selection Settings — Machine On/Off control is determined by the configuration of the Control Method (*Configuration→OPT2→CTRL*) and Cooling Set Point Select (*Configuration→SLCT→CLSP*) variables. All units are factory configured with Cooling Set Point Select set to 0 (single set point). With the control method set to 0, simply switching the Enable/Off/Remote Contact switch to the Enable or Remote Contact position (external contacts closed) will put the chiller in an occupied state. The control mode (*Operating Modes→MODE*) will be 1 (OFF LOCAL) when the switch is Off and will be 5 (ON LOCAL) when in the Enable position or Remote Contact position with external contacts closed.
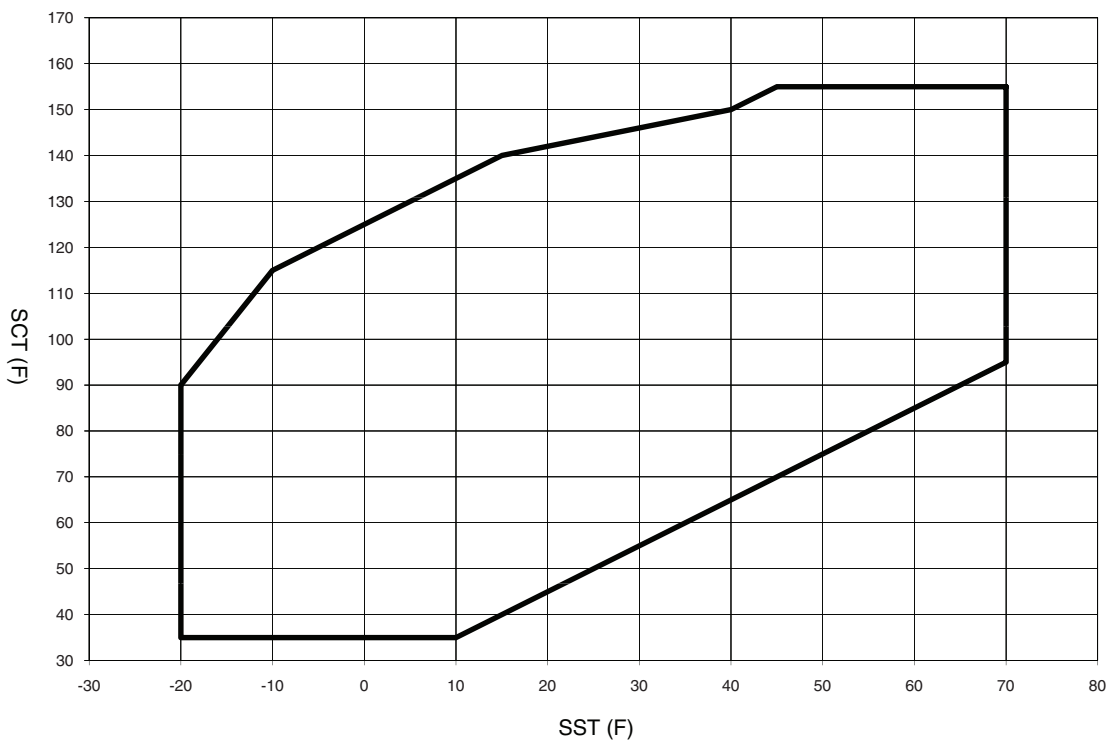
LEGEND
SCT — Saturated Condensing Temperature
SST — Saturated Suction Temperature

Fig. 14 — Operating Envelope for R-410A Compressor
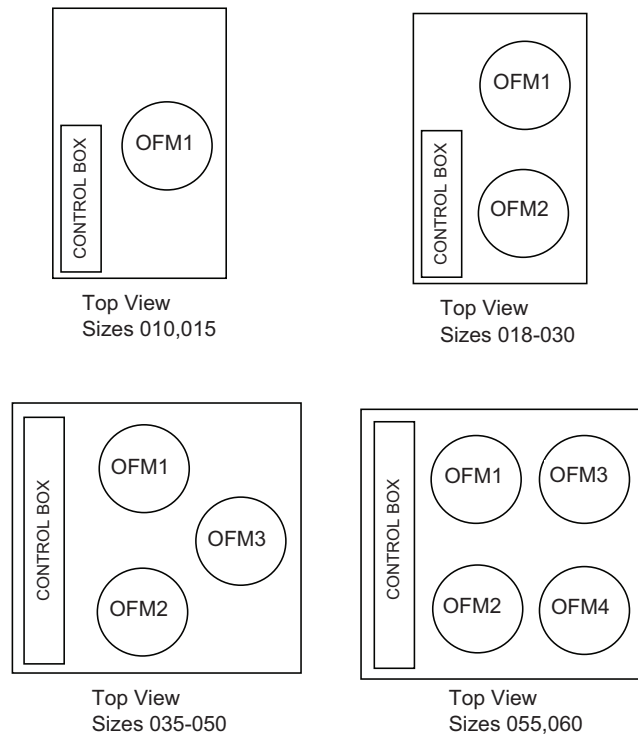
Fig. 15 — 30RAP Condenser Fan Layout

Table 20 — Fan Stages

30RAP UNIT SIZE	FAN STAGES		
	Fan Stage	Contactor Energized	Fans Operating
010,015	Stage 1	—	OFM1
018-030	Stage 1 Stage 2	FC1 FC1,2	OFM1 OFM1,2
035-050	Stage 1 Stage 2 Stage 3	FC1 FC2 FC1,2	OFM3 OFM1,2 OFM1,2,3
055,060	Stage 1 Stage 2 Stage 3 Stage 4	FC3 FC1,3 FC3,2 FC1,2,3	OFM4 OFM4,3 OFM4,1,2 OFM1,2,3,4

Two other control methods are available for Machine On/Off control:

OCCUPANCY SCHEDULE (*Configuration→OPT2 →CTRL = 2*) — The main base board will use the operating schedules as defined under the Time Clock mode in the scrolling marquee display. These schedules are identical. The schedule number must be set to 1 for local schedule.

The schedule number can be set anywhere from 65 to 99 for operation under a CCN global schedule. The Enable/Off/Remote Contact must be in the Enable or Remote Contact position. The control mode (*Operating Modes→MODE*) will be 1 when the switch is Off. The control mode will be 3 when the Enable/Off/Remote Contact switch input is On and the time of day is during an unoccupied period. Similarly, the control mode will be 7 when the time of day is during an occupied period.

CCN CONTROL (*Configuration→OPT2→CTRL = 3*) — An external CCN device such as Chillervisor System Manager controls the On/Off state of the machine. This CCN device forces the variable 'CHIL_S_S' between Start/Stop to control the chiller. The control mode (*Operating Modes→MODE*) will be 1 when the switch is Off. The control mode will be 2 when the Enable/Off/Remote Contact switch input is On and

the CHIL_S_S variable is 'Stop.' Similarly, the control mode will be 6 when the CHIL_S_S variable is 'Start.'

Table 20 illustrates how the control method and cooling set point select variables direct the operation of the chiller and the set point to which it controls. The illustration also shows the ON/OFF state of the machine for the given combinations.

Cooling Set Point Select

SINGLE — Unit operation is based on Cooling Set Point 1 (*Set Points→COOL→CSP.1*).

DUAL SWITCH — Unit operation is based on Cooling Set Point 1 (*Set Points→COOL→CSP.1*) when the Dual Set Point switch contacts are open and Cooling Set Point 2 (*Set Points→COOL→CSP.2*) when they are closed.

DUAL CCN OCCUPIED — Unit operation is based on Cooling Set Point 1 (*Set Points→COOL→CSP.1*) during the Occupied mode and Cooling Set Point 2 (*Set Points→COOL→CSP.2*) during the Unoccupied mode as configured under the local occupancy schedule accessible only from CCN. Schedule Number in Table SCHEDOVR (See Appendix B) must be configured to 1. If the Schedule Number is set to 0, the unit will operate in a continuous 24-hr Occupied mode. Control method must be configured to 0 (switch). See Table 21.

Table 21 — Control Methods and Cooling Set Points

CONTROL TYPE (CTRL)	OCCUPANCY STATE	COOLING SET POINT SELECT (CLSP)			
		0 (single)	1 (dual, switch)	2 (dual, occ)	3 (4 to 20 mA)
0 (switch)	Occupied	ON,CSP1	ON*	ON,CSP1	ON†
	Unoccupied	ON,CSP1	ON*	ON,CSP2	ON
2 (Occupancy)	Occupied	ON,CSP1	ON*	Illegal	ON†
	Unoccupied	OFF	OFF	Illegal	OFF
3 (CCN)	Occupied	ON,CSP1	ON*	ON,CSP1	ON†
	Unoccupied	ON,CSP1	ON*	ON,CSP2	ON†

*Dual set point switch input used. CSP1 used when switch input is open. CSP2 used when switch input is closed.
†Cooling set point determined from 4 to 20 mA input to energy management module (EMM) to terminals TB6-3,5.

4 TO 20 mA INPUT — Unit operation is based on an external 4 to 20 mA signal input to the Energy Management Module (EMM).

Low Sound Mode Operation — All models are factory configured with the Low Sound Mode disabled. In the Configuration mode under sub-mode OPT2, items for Low Sound Mode Select (*Configuration→OPT2→LS.MD*), Low Sound Start Time (*Configuration→OPT2→LS.ST*), Low Sound End Time (*Configuration→OPT2→LS.ND*) and Low Sound Capacity Limit (*Configuration→OPT2→LS.LT*) are factory configured so that the chiller always runs as quietly as possible. This results in operation at increased saturated condensing temperature. As a result, some models may not be able to achieve rated efficiency. For chiller operation at rated efficiency, disable the low sound mode or adjust the low sound mode start and stop times accordingly or set both times to 00:00 for rated efficiency operation 24 hours per day. In addition, the low sound capacity limit can be used to reduce overall chiller capacity, if required, by limiting the maximum to a user-configured percentage.

Heating Operation — The chiller can be used for pump outputs or optional factory-installed hydronic system operation can be utilized for heating applications. The heating mode is activated when the control sees a field-supplied closed switch input to terminal block LVT-19,20. The control locks out cooling when the heat relay input is seen. A field-supplied boiler relay connection is made using heat relay and alarm relay contacts. Factory-installed 'BOILER' connections exist in the control panel near LVT for these applications. Alarms and alerts A189 through A202 are active during heating operation.

Service Test (See Table 4) — *Both main power and control circuit power must be on*.

The Service Test function should be used to verify proper operation of condenser fan(s), compressors, minimum load valve solenoid (if installed), cooler pump(s), EXVs, and remote alarm relay. To use the Service Test mode, the Enable/Off/Remote Contact switch must be in the OFF position. Use the display keys and Table 4 to enter the mode and display TEST. Press ENTER twice so that OFF flashes. Enter the password if required. Use either arrow key to change the TEST value to the ON position and press ENTER. Press ESCAPE and the ▼ button to enter the OUTS or COMP sub-mode.

Test the condenser fans, cooler pump(s) and alarm relay by changing the item values from OFF to ON. These discrete outputs are then turned off if there is no keypad activity for 10 minutes. Use the arrow keys to select the desired percentage when testing expansion valves and Motormaster® V controller. When testing compressors, lead compressor must be started first. All compressor outputs can be turned on, but the control will limit the rate by staging one compressor per minute. Compressor unloaders and hot gas bypass relays/solenoids (if installed) can be tested with the compressors on or off. The relays under the COMP mode will stay on for 10 minutes if there is no keypad activity. Compressors will stay on until they are turned off by the operator. The Service Test mode will remain enabled for as long as there is one or more compressors running. All safeties are monitored during this test and will turn a compressor, circuit or the machine off if required. Any other mode or sub-mode can be accessed, viewed, or changed during the TEST mode. The MODE item (*Run Status→VIEW*) will display "0" as long as the Service mode is enabled. The TEST sub-mode value must be changed back to OFF before the chiller can be switched to Enable or Remote contact for normal operation.

Optional Factory-Installed Hydronic Package — If the chiller has factory-installed chilled fluid pumps, specific steps should be followed for proper operation.

The pump(s) in the hydronic package come factory pre-wired into the main unit power supply/starter. In order to check proper pump rotation, use the Service Test function to test the condenser fans and observe them for proper rotation. If fans turn correctly, the pumps will rotate correctly. Clockwise rotation of the pump motor cooling fans can also be used to determine that pumps are rotating correctly.

⚠ **CAUTION**

Operation of pump in wrong direction, even for a few seconds, can cause irreversible damage to pump impeller and housing. Always verify correct wiring/pump rotation before operation.

Use Service Test function to test operation of pumps. Verify that the flow switch input is made when the pump is running. For dual pump hydronic systems, the control only uses one pump at a time. Consult the Installation Instructions supplied with this chiller and use the circuit setter balancing valve installed in hydronic package to adjust fluid flow rate.

Cooler Pump Control — The AquaSnap® 30RAP machines equipped with a factory-installed pump package are configured with the Cooler Pump Control (*Configuration→OPT1→CPC*) = ON.

Machines not equipped with a pump package are configured with the cooler pump control OFF. It is recommended that the machine control the chilled water pump. If not, a 5-minute time delay is required after the command to shut the machine down is sent before the chilled water pump is turned off. This is required to maintain water flow during the shutdown period of the machine.

With or without this option enabled, the cooler pump relay will be energized when the machine enters an ON status (i.e., On Local, On CCN, On Time). An A207 - Cooler Freeze Protection Alarm, will energize the cooler pump relay also, as an override. The cooler pump relay will remain energized if the machine is in MODE 10 – Minimum Off Time.

Cooler Pump Sequence of Operation — At any-time the unit is in an ON status, as defined by the one of the following conditions, the cooler pump relay will be enabled.

1. The Enable-Off-Remote Switch in ENABLE, (*CTRL*=0).
2. Enable-Off-Remote Switch in REMOTE with a Start-Stop remote contact closure (*CTRL=0*).
3. An Occupied Time Period from an Occupancy Schedule in combination with items 1 or 2 (*CTRL=2*).
4. A CCN Start-Stop Command to Start in combination with items 1 or 2 (*CTRL=3*).

As stated before, there are certain alarm conditions and Operating Modes that will turn the cooler pump relay ON. This sequence will describe the normal operation of the pump control algorithm.

When the unit cycles from an "On" state to an "Off" state, the cooler pump output will remain energized for the Cooler Pump Shutdown Delay (*Configuration→OPT1→PM.DY*). This is configurable from 0 to 10 minutes. The factory default is 1 minute.

NO INTEGRAL PUMP — SINGLE EXTERNAL PUMP CONTROL — With a single external pump, the following options must be configured:

- Cooler Pump Control (*Configuration→OPT1→CPC*) = **OFF**.
- Cooler Pump 1 Enable (*Configuration→OPT1 →PM1E*) = **NO**.
- Cooler Pump 2 Enable (*Configuration→OPT1 →PM2E*) = **NO**.

The maximum load allowed for the Chilled Water Pump Starter is 5 VA sealed, 10 VA inrush at 24 volts. The starter coil is powered from the chiller control system. The starter should be wired between LVT-25 and LVT-21. If equipped, the field-installed chilled water pump starter auxiliary contacts should be connected in series with the chilled water flow switch.

The Cooler Pump Relay will be energized when the machine is "On." The chilled water pump interlock circuit consists of a chilled water flow switch and a field-installed chilled water pump interlock. If the chilled water pump interlock circuit does not close within five (5) minutes of starting, an A200 — Cooler Flow/Interlock Failed to Close at Start-Up Alarm will be generated and chiller will not be allowed to start.

If the chilled water pump interlock or chilled water flow switch opens for at least three (3) seconds after initially being closed, an A201 — Cooler Flow/Interlock Contacts Opened During Normal Operation Alarm will be generated and the machine will stop.

NO INTEGRAL PUMP — DUAL EXTERNAL PUMP CONTROL — With two external pumps, the following options must be configured:

- Cooler Pump Control (*Configuration→OPT1→CPC*) = **ON**.
- Cooler Pump 1 Enable (*Configuration→OPT1 →PM1E*) = **YES**.
- Cooler Pump 2 Enable (*Configuration→OPT1 →PM2E*) = **YES**.

The maximum load allowed for the Chilled Water Pump Starters is 5 VA sealed, 10 VA inrush at 24 volts. The starter coil is powered from the chiller control system. The starter for Chilled Water Pump 1 should be wired between LVT-25 and LVT-21. The starter for Chilled Water Pump 2 should be wired between LVT-24 and LVT-21. A field-installed chilled water pump interlock for each pump must be connected to each pump's interlock points on the main base board. The chilled water pump 1 interlock, CWP1, must be connected to MBB-J7-1 and –2. The chilled water pump 2 interlock, CWP2, must be connected to MBB-J7-3 and –4. The chilled water pump

interlock contacts should be rated for dry circuit application capable of handling 5 vdc at 2 mA.

SINGLE INTEGRAL PUMP CONTROL — With a single pump, the following options must be configured:

- Cooler Pump Control (*Configuration→OPT1→CPC*) = **ON**.
- Cooler Pump 1 Enable (*Configuration→OPT1 →PM1E*) = **YES**.
- Cooler Pump 2 Enable (*Configuration→OPT1 →PM2E*) = **NO**.

With a single integral pump, the Cooler Pump Starter will be energized when the machine is occupied. As part of the factory-installed package, an auxiliary set of contacts is wired to the MBB to serve as Chilled Water Pump Interlock. When the mechanical cooling is called for, the pump interlock and flow switch is checked. If the circuits are closed, the machine starts its capacity routine. If the auxiliary contact interlock does not close within 25 seconds of the ON command, a T190 — Cooler Pump 1 Aux Contacts Failed to Close at Start-Up Alert will be generated and the pump shut down. The unit will not be allowed to start. If the chilled water flow switch does not close within one (1) minute, two alarms will be generated. A T192 — Cooler Pump 1 Failed to Provide Flow at Start-Up Alert and an A200 — Cooler Flow/Interlock Failed to Close at Start-Up Alarm will be generated and chiller will not be allowed to start.

If the chilled water flow switch opens for at least 3 seconds after initially being closed, a T196 — Flow Lost While Pump 1 Running Alert and an A201 — Cooler Flow/Interlock Contacts Opened During Normal Operation Alarm will be generated and the machine will stop.

If the control detects the chilled water pump interlock open for 25 seconds after initially being closed, a T194 — Cooler Pump 1 Contacts Opened During Normal Operation Alert is generated and the unit is shut down.

If the control detects the chilled water flow switch circuit closed for at least 5 minutes with the pump output OFF, an A202 — Cooler Pump Interlock Closed When Pump is Off Alarm will be generated and the unit will not be allowed to start.

If the control detects that the chilled water pump auxiliary contacts are closed for at least 25 seconds while the pump is OFF, a T198 — Cooler Pump 1 Aux Contacts Closed While Pump Off Alert is generated. The chiller will not be allowed to start.

If the control starts a pump and the wrong interlock circuit closes for at least 20 seconds, an A189 — Cooler Pump and Aux Contact Input Miswire Alarm will be generated. The unit will be prevented from starting.

As part of a pump maintenance routine, the pump can be started to maintain lubrication of the pump seal. To utilize this function, Cooler Pmp Periodic Start (*Configuration→OPT1 →PM.P.S*) must be set to YES. This option is set to NO as the factory default. With this feature enabled, if the pump is not operating, it will be started and operated for 2 seconds starting at 14:00 hours. If the pump is operating, this routine is skipped. If the pump has failed and an Alarm/Alert condition is active, the pump will not start that day.

DUAL INTEGRAL PUMP CONTROL — With a dual integral pump package, the following options must be configured:

- Cooler Pump Control (*Configuration→OPT1→CPC*) = **ON**.
- Cooler Pump 1 Enable (*Configuration→OPT1 →PM1E*) = **YES**.
- Cooler Pump 2 Enable (*Configuration→OPT1 →PM2E*) = **YES**.

Pump Start Selection is a field-configurable choice. Cooler Pump Select (*Configuration→OPT1→PM.SL*) is factory defaulted to 0 (Automatic). This value can be changed to 1

(Pump 1 Starts First) or 2 (Pump 2 Starts First). If **PM.SL** is 0 (Automatic), the pump selection is based on two criteria: the alert status of a pump and the operational hours on the pump. If a pump has an active Alert condition, it will not be considered for the lead pump. The pump with the lowest operational hours will be the lead pump. A pump is selected by the control to start and continues to be the lead pump until the Pump Changeover Hours (**Configuration→OPT1→PM.DT**) is reached. The Lead Pump (**Run Status→VIEW→LD.PM**) indicates the pump that has been selected as the lead pump: 1 (Pump 1), 2 (Pump 2), 3 (No Pump). The Pump Changeover Hours is factory defaulted to 500 hours. Regardless of the Cooler Pump Selection, any pump that has an active alert will not be allowed to start.

With the dual integral pump package, the Cooler Pump Starter will be energized when the machine is in an occupied period. As part of the factory-installed package, an auxiliary set of contacts is wired to the MBB to serve as Chilled Water Pump Interlock, one set for each pump to individual channels on the MBB. With a call for mechanical cooling, the specific pump interlock and flow switch are checked. If the circuits are closed, the machine starts its capacity routine. If Pump 1 starts and the auxiliary contact interlock does not close within 25 seconds of the ON command, a T190 — Cooler Pump 1 Aux Contacts Failed to Close at Start-Up Alert will be generated and the pump shut down. The unit will not be allowed to start. If the chilled water flow switch does not close within 1 minute, two alarms will be generated. A T192 — Cooler Pump 1 Failed to Provide Flow at Start-Up Alert and an A200 — Cooler Flow/Interlock Failed to Close at Start-Up Alarm will be generated and chiller will not be allowed to start. In either fault case listed above, Pump 2 will be commanded to start once Pump 1 has failed.

If Pump 2 starts and the auxiliary contact interlock does not close within 25 seconds of the ON command, a T191 — Cooler Pump 2 Aux Contacts Failed to Close at Start-Up Alert will be generated and the pump shut down. The unit will not be allowed to start. If the chilled water flow switch does not close within one (1) minute, two alarms will be generated. A T193 — Cooler Pump 2 Failed to Provide Flow at Start-Up Alert and an A200 — Cooler Flow/Interlock Failed to Close at Start-Up Alarm will be generated and chiller will not be allowed to start. In either fault case listed above, Pump 1 will be commanded to start once Pump 2 has failed.

If the chilled water flow switch opens for at least 3 seconds after initially being closed, a T196 — Flow Lost While Pump 1 Running Alert or T197 — Flow Lost While Pump 2 Running Alert for the appropriate pump and an A201 — Cooler Flow/Interlock Contacts Opened During Normal Operation Alarm will be generated and the machine will stop. If available, the other pump will be started. If flow is proven, the machine will be allowed to restart.

If the chilled water pump interlock opens for 25 seconds after initially being closed is detected by the control, the appropriate T194 — Cooler Pump 1 Contacts Opened During Normal Operation Alert or T195 — Cooler Pump 2 Contacts Opened During Normal Operation Alert is generated and the unit is shut down. If available, the other pump will be started. If flow is proven, the machine will be allowed to restart.

If the control detects that the chilled water flow switch circuit is closed for at least 5 minutes with the pump output OFF, an A202 — Cooler Pump Interlock Closed When Pump is Off Alarm will be generated and the unit will not be allowed to start.

If the control detects that the chilled water pump auxiliary contacts are closed for at least 25 seconds while the pump is OFF, the appropriate T198 — Cooler Pump 1 Aux Contacts Closed While Pump Off or Alert T199 — Cooler Pump 2 Aux Contacts Closed While Pump Off Alert is generated. The chiller will not be allowed to start.

If the control starts a pump and the wrong interlock circuit closes for at least 20 seconds, an A189 – Cooler Pump and Aux Contact Input Miswire Alarm will be generated. The unit will be prevented from starting.

The control will allow for pump changeover. Two methods will change the pump sequence. Before the changeover can occur, the unit must be at Capacity Stage 0. During changeover the chilled water flow switch input is ignored for 10 seconds to avoid a nuisance alarm.

With Cooler Pump Select (**Configuration→OPT1→PM.SL**) set to 0 (Automatic) and when the differential time limit Pump Changeover Hours (**Configuration→OPT1→PM.DT**) is reached, the lead pump will be turned OFF. Approximately one (1) second later, the lag pump will start. Manual changeover can be accomplished by changing Rotate Cooler Pump Now (**Configuration→OPT1→ROT.P**) to YES only if the machine is at Capacity Stage 0 and the differential time limit Pump Changeover Hours (**PM.DT**) is reached. If the **PM.DT** is not satisfied, the changeover will not occur. With the machine at Capacity Stage 0, the pumps would rotate automatically as part of the normal routine.

With Cooler Pump Select (**PM.SL**) set to 1 (Pump 1 Starts First) or 2 (Pump 2 Starts First), a manual changeover can be accomplished by changing **PM.SL** only. The machine Remote-Off-Enable Switch must be in the OFF position to change this variable. The Rotate Cooler Pump Now (**ROT.P**) feature does not work for these configuration options.

As part of a pump maintenance routine, the pumps can be started to maintain lubrication to the pump seal. To utilize this function, Cooler Pmp Periodic Start (**Configuration→OPT1→PM.PS**) must be set to YES. This option is set to NO as the factory default. If feature is enabled and the pump(s) are not operating, then the pumps will be operated every other day for 2 seconds starting at 14:00 hours. If a pump has failed and has an active Alert condition, it will not be started that day.

Configuring and Operating Dual Chiller Control — The dual chiller routine is available for the control of two units supplying chilled fluid on a common loop. This control algorithm is designed for parallel fluid flow arrangement only. One chiller must be configured as the master chiller, the other as the slave. An additional leaving fluid temperature thermistor (Dual Chiller LWT) must be installed as shown in Fig. 16 and 17 and connected to the master chiller. Refer to Sensors section, page 20, for wiring. The CCN communication bus must be connected between the two chillers. Connections can be made to the CCN screw terminals on LVT. Refer to Carrier Comfort Network® Interface section, page 19, for wiring information. Configuration examples are shown in Tables 22 and 23.

Refer to Table 22 for dual chiller configuration. In this example the master chiller will be configured at address 1 and the slave chiller at address 2. The master and slave chillers must reside on the same CCN bus (**Configuration→CCN→CCNB**) but cannot have the same CCN address (**Configuration→CCN→CCNA**). Both master and slave chillers must have Lead/Lag Chiller Enable (**Configuration→RSET→LLEN**) configured to ENBL. Master/Slave Select (**Configuration→RSET →MSSL**) must be configured to MAST for the master chiller and SLVE for the slave. Also in this example, the master chiller will be configured to use Lead/Lag Balance Select (**Configuration→RSET→LLBL**) and Lead/Lag Balance Delta (**Configuration→RSET→LLBD**) to even out the chiller run-times weekly. The Lag Start Delay (**Configuration→RSET→LLDY**) feature will be set to 10 minutes. This will prevent the lag chiller from starting until the lead chiller has been at 100% capacity for the length of the delay time. Parallel configuration (**Configuration→RSET→PARA**) can only be configured to YES. The variables **LLBL**, **LLBD** and **LLDY** are not used by the slave chiller.

Table 22 — Dual Chiller Configuration (Master Chiller Example)

SUB-MODE	ITEM	KEYPAD ENTRY	DISPLAY	ITEM EXPANSION	COMMENTS
DISP					
UNIT					
OPT1					
OPT2		ENTER	CTRL	CONTROL METHOD	
	CTRL	ENTER	0	SWITCH	DEFAULT 0
		ESCAPE	OPT2		
CCN		↓	CCN		
	CCNA	ENTER	1	CCN ADDRESS	DEFAULT 1
		↓	CCNB		
	CCNB	ENTER	0	CCN BUS NUMBER	DEFAULT 0
		ESCAPE	CCN		
		↓	RSET		PROCEED TO SUBMODE **RESET**
RSET		ENTER	CRST	COOLING RESET TYPE	
		↓	LLEN	LEAD/LAG CHILLER ENABLE	↓ 15 ITEMS
	LLEN	ENTER	DSBL		SCROLLING STOPS
		ENTER	DSBL		VALUE FLASHES
		↑	ENBL		SELECT ENBL
	LLEN	ENTER	ENBL	LEAD/LAG CHILLER ENABLE	CHANGE ACCEPTED
		ESCAPE	LLEN		
		↓	MSSL	MASTER /SLAVE SELECT	
	MSSL	ENTER	MAST	MASTER /SLAVE SELECT	DEFAULT MAST
		ESCAPE	MSSL		
		↓	SLVA	SLAVE ADDRESS	
	SLVA	ENTER	0		SCROLLING STOPS
		ENTER	0		VALUE FLASHES
		↑	2		SELECT 2
	SLVA	ENTER	2	SLAVE ADDRESS	CHANGE ACCEPTED
		ESCAPE	SLVA		
		↓	LLBL	LEAD/LAG BALANCE SELECT	
	LLBL	ENTER	0		SCROLLING STOPS
		ENTER	0		VALUE FLASHES
		↑	2		SELECT 2 - Automatic

Table 22 — Dual Chiller Configuration (Master Chiller Example) (cont)

SUB-MODE	ITEM	KEYPAD ENTRY	DISPLAY	ITEM EXPANSION	COMMENTS
	LLBL	ENTER	2	LEAD/LAG BALANCE SELECT	CHANGE ACCEPTED
		ESCAPE	LLBL		
		↓	LLBD	LEAD/LAG BALANCE DELTA	
	LLBD	ENTER	168	LEAD/LAG BALANCE DELTA	DEFAULT 168
		ESCAPE	LLBD		
		↓	LLDY	LAG START DELAY	
RSET	LLDY	ENTER	5		SCROLLING STOPS
		ENTER	5		VALUE FLASHES
		↑	10		SELECT 10
	LLDY	ENTER	10	LAG START DELAY	CHANGE ACCEPTED
		ESCAPE	LLDY		
		ESCAPE	RSET		
	PARA	ENTER	YES		MASTER COMPLETE

NOTES:
1. Master Control Method (CTRL) can be configured as 0-Switch, 2-Occupancy or 3-CCN.
2. Parallel Configuration (PARA) cannot be changed.

Dual chiller start/stop control is determined by configuration of Control Method (*Configuration→OPT1→CTRL*) of the Master chiller. The Slave chiller should always be configured for *CTRL*=0 (Switch). If the chillers are to be controlled by Remote Contacts, both Master and Slave chillers should be enabled together. Two separate relays or one relay with two sets of contacts may control the chillers. The Enable/Off/Remote Contact switch should be in the Remote Contact position on both the Master and Slave chillers. The Enable/Off/Remote Contact switch should be in the Enable position for *CTRL*=2 (Occupancy) or *CTRL*=3 (CCN Control).

Both chillers will stop if the Master chiller Enable/Off/Remote Contact switch is in the Off position. If the Emergency Stop switch is turned off or an alarm is generated on the Master chiller the Slave chiller will operate in a Stand-Alone mode. If the Emergency Stop switch is turned off or an alarm is generated on the Slave chiller the Master chiller will operate in a Stand-Alone mode.

The master chiller controls the slave chiller by changing its Control Mode (*Run Status→VIEW→STAT*) and its operating setpoint or Control Point (*Run Status→VIEW→CT.PT*).
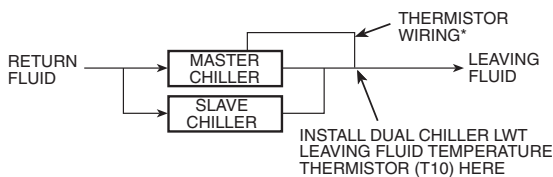
*Depending on piping sizes, use either:
• HH79NZ014 sensor/10HB50106801 well (3-in. sensor/well)
• HH79NZ029 sensor/10HB50106802 well (4-in. sensor/well)

Fig. 16 — Dual Chiller Thermistor Location

PART NUMBER	DIMENSIONS in. (mm)	
	A	B
10HB50106801	3.10 (78.7)	1.55 (39.4)
10HB50106802	4.10 (104.1)	1.28 (32.5)
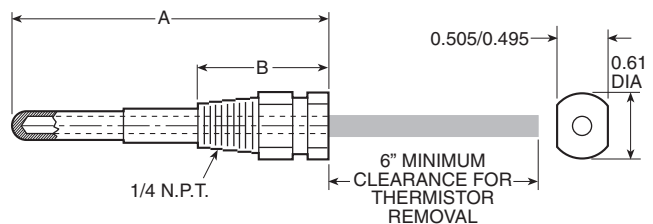
Fig. 17 — Dual Leaving Water Thermistor Well

Temperature Reset — The control system is capable of handling leaving-fluid temperature reset based on return cooler fluid temperature. Because the change in temperature through the cooler is a measure of the building load, the return temperature reset is in effect an average building load reset method. The control system is also capable of temperature reset based on outdoor-air temperature (OAT), space temperature (SPT), or from an externally powered 4 to 20 mA signal. Accessory sensors must be used for SPT reset (33ZCT55SPT). The energy management module (EMM) must be used for temperature reset using a 4 to 20 mA signal. See Tables 24 and 25.

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Table 23 — Dual Chiller Configuration (Slave Chiller Example)

SUB-MODE	ITEM	KEYPAD ENTRY	DISPLAY	ITEM EXPANSION	COMMENTS
DISP					
UNIT					
OPT1					
OPT2		ENTER	CTRL	CONTROL METHOD	
	CTRL		0	SWITCH	DEFAULT 0
		ESCAPE	OPT2		
CCN		↓	CCN		
		↓	CCNA		
	CCNA	ENTER	1	CCN ADDRESS	SCROLLING STOPS
		ENTER	1		VALUE FLASHES
		↑	2		SELECT 2 (SEE NOTE 1)
	CCNA	ENTER	2	CCN ADDRESS	CHANGE ACCEPTED
		ESCAPE	CCN		
	CCNB	ENTER	0	CCN BUS NUMBER	DEFAULT 0 (SEE NOTE 2)
		ESCAPE	CCN		
		↓	RSET		PROCEED TO SUBMODE **RSET**
RSET		ENTER	CRST	COOLING RESET TYPE	
		↓	LLEN	LEAD/LAG CHILLER ENABLE	↓ 15 ITEMS
	LLEN	ENTER	DSBL		SCROLLING STOPS
		ENTER	DSBL		VALUE FLASHES
		↑	ENBL		SELECT ENBL
	LLEN	ENTER	ENBL	LEAD/LAG CHILLER ENABLE	CHANGE ACCEPTED
		ESCAPE	LLEN		
		↓	MSSL	MASTER /SLAVE SELECT	
	MSSL	ENTER	MAST		SCROLLING STOPS
		ENTER	MAST		VALUE FLASHES
		↑	SLVE		SELECT SLVE
	MSSL	ENTER	SLVE	MASTER /SLAVE SELECT	CHANGE ACCEPTED
		ESCAPE	MSSL		
		ESCAPE	RSET		SLAVE COMPLETE

NOTES:
1. Slave Control Method (CTRL) must be configured for 0.
2. Slave CCN Address (CCNA) must be different than Master.
3. Slave CCN Bus Number (CCNB) must be the same as Master
4. Slave does not require SLVA, LLBL, LLBD, or LLDY to be configured.

Table 24 — 4 to 20 mA Reset

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
RSET	ENTER	CRST	1	COOLING RESET TYPE	0 = no reset 1 = 4 to 20 mA input 2 = Outdoor air temp 3 = Return Fluid 4 = Space Temperature
	▼	MA.DG	5.0 F (2.8 C)	DEGREES COOL RESET	Default: 0° F (0° C) Reset at 20 mA Range: –30 to 30 F (–16.7 to 16.7 C)

NOTE: The example above shows how to configure the chiller for 4 to 20 mA reset. No reset will
occur at 4.0 mA input, and a 5.0 F reset will occur at 20.0 mA. An EMM is required.

Table 25 — Menu Configuration of 4 to 20 mA Cooling Set Point Control

MODE (RED LED)	KEYPAD ENTRY	SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
CONFIGURATION	ENTER	DISP					
	▼	UNIT					
	▼	OPT1					
	▼	OPT2					
	▼	HP.A					
	▼	HP.B					
	▼	EXV.A					
	▼	EXV.B					
	▼	M.MST					
	▼	RSET					
	▼	DMDC					
	▼	SLCT	ENTER	CLSP	0	COOLING SETPOINT SELECT	
			ENTER		0		Scrolling Stops
			ENTER		0		Flashing '0'
			▲		4		Select '4'
			ENTER		4		Change Accepted

IMPORTANT: Care should be taken when interfacing with other control systems due to possible power supply differences: full wave bridge versus half wave rectification. Connection of control devices with different power supplies may result in permanent damage. *Comfort*Link™ controls incorporate power supplies with half wave rectification. A signal isolation device should be utilized if the signal generator incorporates a full wave bridge rectifier.

To use outdoor air or space temperature reset, four variables must be configured. In the Configuration mode under the sub-mode RSET, items (*Configuration→OPT1→CRST*), (*Configuration→OPT1→RM.NO*), (*Configuration→OPT1→RM.F*), and (*Configuration→OPT1→RT.DG*) must be properly set. See Table 26A — Configuring Outdoor Air and Space Temperature Reset. The outdoor air reset example provides 0° F (0° C) chilled water set point reset at 85.0 F (29.4 C) outdoor-air temperature and 15.0 F (8.3 C) reset at 55.0 F (12.8 C) outdoor-air temperature. The space temperature reset example provides 0° F (0° C) chilled water set point reset at 72.0 F (22.2 C) space temperature and 6.0 F (3.3 C) reset at 68.0 F (20.0 C) space temperature. The variable *CRST* should

be configured for the type of reset desired. The variable *RM.NO* should be set to the temperature that no reset should occur. The variable *RM.F* should be set to the temperature that maximum reset is to occur. The variable *RM.DG* should be set to the maximum amount of reset desired. Figures 18 and 19 are examples of outdoor air and space temperature resets.

To use return reset, four variables must be configured. In the Configuration mode under the sub-mode *RSET*, items *CRST*, *RT.NO*, *RT.F* and *RT.DG* must be properly set. See Table 26B — Configuring Return Temperature Reset. This example provides 5.0 F (2.8 C) chilled water set point reset at 2.0 F (1.1 C) cooler ΔT and 0° F (0° C) reset at 10.0 F (5.6 C) cooler ΔT. The variable RT.NO should be set to the cooler temperature difference (ΔT) where no chilled water temperature reset should occur. The variable *RT.F* should be set to the cooler temperature difference where the maximum chilled water temperature reset should occur. The variable *RM.DG* should be set to the maximum amount of reset desired.

To verify that reset is functioning correctly proceed to Run Status mode, sub-mode VIEW, and subtract the active set point (*Run Status→VIEW→SETP*) from the control point (*Run Status→VIEW→CTPT*) to determine the degrees reset.

Table 26A — Configuring Outdoor Air and Space Temperature Reset

MODE (RED LED)	KEYPAD ENTRY	SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY Outdoor Air	DISPLAY Space	ITEM EXPANSION	COMMENT
CONFIGURATION	ENTER	DISP						
	▼	UNIT						
	▼	OPT1						
	▼	OPT2						
	▼	HP.A						
	▼	HP.B						
	▼	EXV.A						
	▼	EXV.B						
	▼	M.MST						
	▼	RSET	ENTER	CRST	2	4	COOLING RESET TYPE	2 = Outdoor-Air Temperature 4 = Space Temperature (Connect to TB5-5,6)
			▼	RM.NO*	85 °F	72 °F	REMOTE - NO RESET TEMP	Default: 125.0 F (51.7 C) Range: 0° to125 F
			▼	RM.F	55 °F	68 °F	REMOTE - FULL RESET TEMP	Default: 0.0° F (-17.7 C) Range: 0° to 125 F
			▼	RM.DG	15 °F	6 °F	REMOTE - DEGREES RESET	Default: 0° F (0° C) Range: –30 to 30 F (–34.4 to -1.1 °C)

*4 items skipped in this example.

Table 26B — Configuring Return Temperature Reset

MODE (RED LED)	KEYPAD ENTRY	SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
CONFIGURATION	ENTER	DISP	ENTER	TEST	ON/OFF	TEST DISPLAY LEDs	
	▼	UNIT	ENTER	TYPE	X	UNIT TYPE	
	▼	OPT1	ENTER	FLUD	X	COOLER FLUID	
	▼	OPT2	ENTER	CTRL	X	CONTROL METHOD	
	▼	HP.A					
	▼	HP.B					
	▼	EXV.A					
	▼	EXV.B					
	▼	M.MST					
	▼	RSET	ENTER	CRST	3	COOLING RESET TYPE	0 = No Reset 1 = 4 to 20 mA Input (EMM required) (Connect to EMM TB6-2,3) 2 = Outdoor-Air Temperature 3 = Return Fluid 4 = Space Temperature (Connect to TB5-5,6)
			▼	RT.NO*	10.0 ΔF	RETURN FLUID - NO RESET TEMP	Default: 10.0 ΔF (5.6 ΔC) Range: 0° to10 F COOLER ΔT
			▼	RT.F	0.0 ΔF	RETURN FLUID - FULL RESET TEMP	Default: 0 ΔF (–17.8 ΔC) Range: 0° to 30 F COOLER ΔT
			▼	RT.DG	10.0 ΔF	RETURN - DEGREES RESET	Default: 0 ΔF (0 ΔC) Range: –30 to 30°F (–16.7 to 16.7 C)

*4 items skipped in this example.

Under normal operation, the chiller will maintain a constant leaving fluid temperature approximately equal to the chilled fluid set point. As the cooler load varies, the entering cooler fluid will change in proportion to the load as shown in Fig. 20. Usually the chiller size and leaving-fluid temperature set point are selected based on a full-load condition. At part load, the fluid temperature set point may be colder than required. If the leaving fluid temperature was allowed to increase at part load, the efficiency of the machine would increase.

Return temperature reset allows for the leaving temperature set point to be reset upward as a function of the return fluid temperature or, in effect, the building load.

Demand Limit — Demand limit is a feature that allows the unit capacity to be limited during periods of peak energy usage. There are 3 types of demand limiting that can be configured. The first type is through 2-stage switch control, which will reduce the maximum capacity to 2 user-configurable percentages. The second type is by 4 to 20 mA signal input which will reduce the maximum capacity linearly between 100% at a 4 mA input signal (no reduction) down to the user-configurable level at a 20 mA input signal. The third type uses the CCN Loadshed module and has the ability to limit the current operating capacity to maximum and further reduce the capacity if required.

NOTE: The 2-stage switch control and 4 to 20-mA input signal types of demand limiting require the energy management module (EMM).

LEGEND

LWT — Leaving Water (Fluid) Temperature

Fig. 18 — Outdoor-Air Temperature Reset

LEGEND

LWT — Leaving Water (Fluid) Temperature

Fig. 19 — Space Temperature Reset
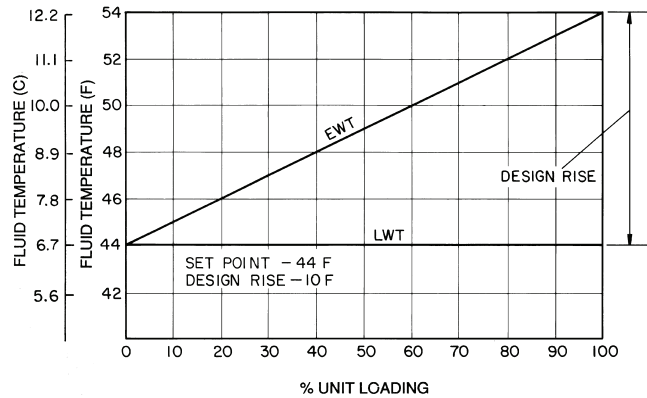
LEGEND

EWT — Entering Water (Fluid) Temperature
LWT — Leaving Water (Fluid) Temperature

Fig. 20 — Standard Chilled Fluid Temperature Control — No Reset

To use demand limit, select the type of demand limiting to use. Then configure the demand limit set points based on the type selected.

DEMAND LIMIT (2-Stage Switch Controlled) — To configure demand limit for 2-stage switch control set the Demand Limit Select (*Configuration→RSET→DMDC*) to 1. Then configure the 2 Demand Limit Switch points (*Configuration→RSET→DLS1*) and (*Configuration→RSET→DLS2*) to the desired capacity limit. See Table 27. Capacity steps are controlled by 2 relay switch inputs field wired to TB6 as shown in Fig. 6 and 7.

For demand limit by 2-stage switch control, closing the first stage demand limit contact will put the unit on the first demand limit level. The unit will not exceed the percentage of capacity entered as Demand Limit Switch 1 set point (*DLS1*). Closing contacts on the second demand limit switch prevents the unit from exceeding the capacity entered as Demand Limit Switch 2 set point. The demand limit stage that is set to the lowest demand takes priority if both demand limit inputs are closed. If the demand limit percentage does not match unit staging, the unit will limit capacity to the closest capacity stage.

To disable demand limit configure *DMDC* to 0. See Table 27.

EXTERNALLY POWERED DEMAND LIMIT (4 to 20 mA Controlled) — To configure demand limit for 4 to 20 mA control set the Demand Limit Select (*Configuration→RSET→DMDC*) to 2. Then configure the Demand Limit at 20 mA (*Configuration→RSET→DM20*) to the maximum loadshed value desired. Connect the output from an externally powered 4 to 20 mA signal to terminal block TB6, terminals 1 and 5. Refer to the unit wiring diagram for these connections to the optional/accessory energy management module and terminal block. The control will reduce allowable capacity to this level for the 20 mA signal. See Table 27 and Fig. 21.
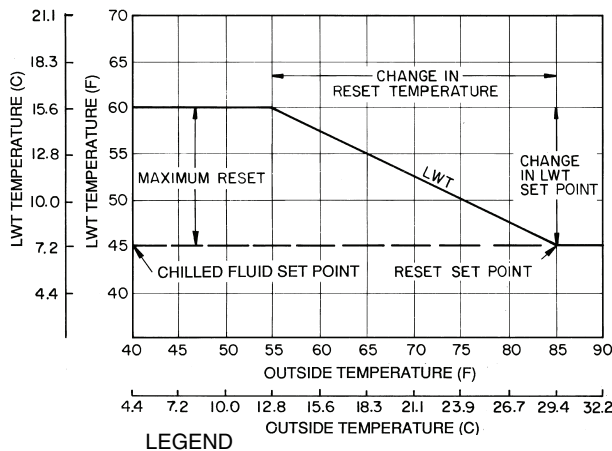
⚠ **CAUTION**

Care should be taken when interfacing with other manufacturer's control systems, due to possible power supply differences, full wave bridge versus half wave rectification. The two different power supplies cannot be mixed. *Comfort*Link™ controls use half wave rectification. A signal isolation device should be utilized if a full wave bridge signal generating device is used.

DEMAND LIMIT (CCN Loadshed Controlled) — To configure Demand Limit for CCN Loadshed control set the Demand Limit Select (*Configuration→RSET→DMDC*) to 3. Then configure the Loadshed Group Number (*Configuration→RSET→SHNM*), Loadshed Demand Delta (*Configuration→RSET→SHDL*), and Maximum Loadshed Time (*Configuration→RSET→SHTM*). See Table 27.

The Loadshed Group number is established by the CCN system designer. The *Comfort*Link controls will respond to a Redline command from the Loadshed control. When the Redline command is received, the current stage of capacity is set to the maximum stages available. Should the loadshed control send a Loadshed command, the *Comfort*Link controls will reduce the current stages by the value entered for Loadshed Demand delta. The Maximum Loadshed Time is the maximum length of time that a loadshed condition is allowed to exist. The control will disable the Redline/Loadshed command if no Cancel command has been received within the configured maximum loadshed time limit.

Cooling Set Point (4 to 20 mA) — A field supplied and generated, externally powered 4 to 20 mA signal can be used to provide the leaving fluid temperature set point. Connect the signal to LVT7,8 (+,–). See Table 27 for instructions to enable the function. Figure 22 shows how the 4 to 20 mA signal is linearly calculated on an overall 10 F to 80 F range for fluid types (*Configuration→OPT1→FLUD*) 1 or 2. The set point will be limited by the fluid (*FLUD*) type. Be sure that the chilled water loop is protected at the lowest temperature.
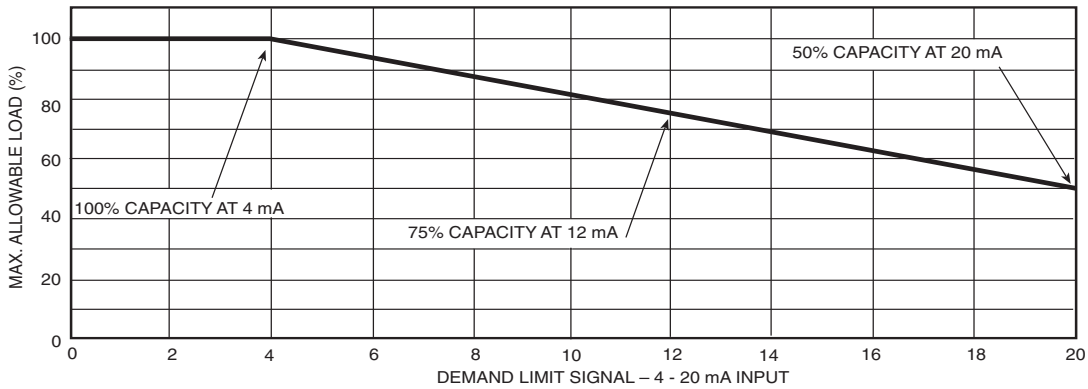
Fig. 21 — 4 to 20-mA Demand Limiting
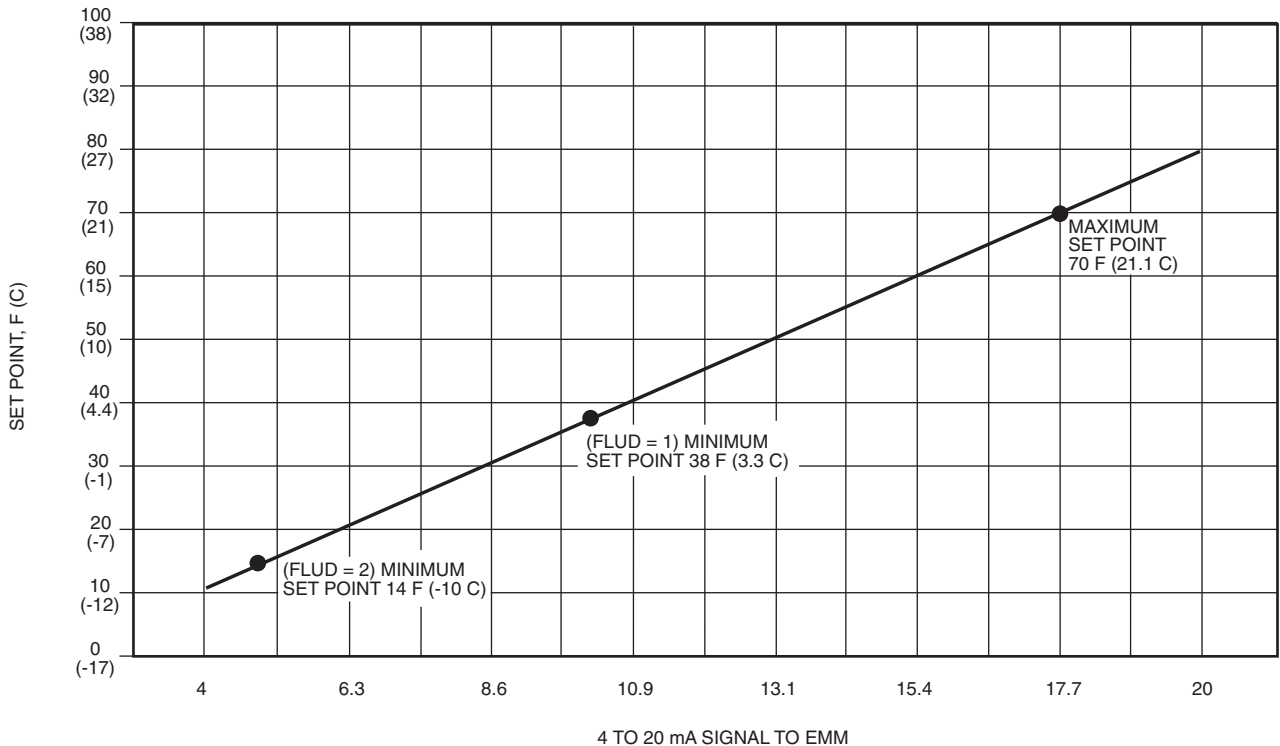
EMM — Energy Management Module

Fig. 22 — Cooling Set Point (4 to 20 mA)

Table 27 — Configuring Demand Limit

MODE	KEYPAD ENTRY	SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT
CONFIGURATION	ENTER	DISP	ENTER	TEST	ON/OFF	Test Display LEDs	
	▼	UNIT	ENTER	TYPE	X	Unit Type	
	▼	OPT1	ENTER	FLUD	X	Cooler Fluid	
	▼	OPT2	ENTER	CTRL	X	Control Method	
	▼	HP.A					
	▼	HP.B					
	▼	EXV.A					
	▼	EXV.B					
	▼	M.MST					
	▼	RSET	ENTER	CRST	X	Cooling Reset Type	
			▼	DMDC*	X	Demand Limit Select	Default: 0 0 = None 1 = Switch 2 = 4 to 20 mA Input 3 = CCN Loadshed
			▼	DM20	XXX %	Demand Limit at 20 mA	Default: 100% Range: 0 to 100
			▼	SHNM	XXX	Loadshed Group Number	Default: 0 Range: 0 to 99
			▼	SHDL	XXX%	Loadshed Demand Delta	Default: 0% Range: 0 to 60%
			▼	SHTM	XXX MIN	Maximum Loadshed Time	Default: 60 min. Range: 0 to 120 min.
			▼	DLS1	XXX %	Demand Limit Switch 1	Default: 80% Range: 0 to 100%
			▼	DLS2	XXX %	Demand Limit Switch 2	Default: 50% Range: 0 to 100%

*Seven items skipped in this example.

Digital Scroll Option — The 30RAP units have a factory-installed option for a digital scroll compressor which provides additional stages of unloading for the unit. The digital compressor is always installed in the A1 compressor location. When a digital compressor is installed, a digital unloader solenoid (DUS) is used on the digital compressor.

DIGITAL SCROLL OPERATION — A digital scroll operates in two stages - the "loaded state" when the solenoid valve is normally closed and the "unloaded state" when the solenoid valve is open. During the loaded state, the compressor operates like a standard scroll and delivers full capacity and mass flow.

However, during the unloaded state, there is no capacity and no mass flow through the compressor. The capacity of the system is varied by varying the time the compressor operates in an unloaded and loaded state during a 15-second period. If the DUS is energized for 7 seconds, the compressor will be operating at 47% capacity. If the DUS is energized for 10 seconds, the compressor will be operating at approximately 33% of its capacity. Capacity is the time averaged summation of loaded and unloaded states, and its range is continuous from the minimum configured capacity to 100%. Regardless of capacity, the compressor always rotates with constant speed. As the compressor transitions from a loaded to unloaded state, the discharge and suction pressures will fluctuate and the compressor sound will change.

The *Comfort*Link controller controls and integrates the operation of the DUS into the compressor staging routine to maintain temperature control. When a digital compressor is installed, an additional discharge gas temperature thermistor (DTT) is installed along with the AUX board for control of the DUS.

DIGITAL COMPRESSOR CONFIGURATION — When a digital compressor is installed, the configuration parameter (*Configuration→UNIT→A1TY*) is configured to YES. There is also a maximum unload time configuration, (*Configuration→UNIT→MAX.T*) that is set to 7 seconds, which indicates the maximum unloading for the digital compressor is 47%. This is done to optimize efficiency of the system.

PRE-START-UP

IMPORTANT: Before beginning Pre-Start-Up or Start-Up, complete Start-Up Checklist for 30RAP Liquid Chiller at end of this publication (pages CL-1 to CL-10). The checklist assures proper start-up of a unit, and provides a record of unit condition, application requirements, system information, and operation at initial start-up.

Do not attempt to start the chiller until following checks have been completed.

System Check

1. Check all auxiliary components, such as chilled fluid pumps, air-handling equipment, or other equipment to which the chiller supplies liquid. Consult manufacturer's instructions. Verify that any pump interlock contacts have been properly installed. If the unit If the unit has field-installed accessories, be sure all are properly installed and wired correctly. Refer to unit wiring diagrams.

2. Use the scrolling marquee display to adjust the Cooling Set Point.

3. Fill chilled fluid circuit with clean water (with recommended inhibitor added) or other non-corrosive fluid to be cooled. Bleed all air out of the high points of the system. If chilled water is to be maintained at a temperature below 40 F (4.4 C) or outdoor temperatures are expected to be below 32 F (0° C), a brine of sufficient concentration must be used to prevent freeze-up at anticipated suction temperatures. See Table 28.

4. Check tightness of all electrical connections.

5. Oil should be visible in the compressor sightglass(es). See Fig. 23. An acceptable oil level in the compressors is from $\frac{1}{8}$ to $\frac{3}{8}$ of sight glass. Adjust the oil level as required. See Oil Charge section on page 50 for Carrier approved oils.

6. Electrical power source must agree with unit nameplate.

7. All condenser fan and factory installed hydronic package pump motors are three phase. Check for proper rotation of condenser fans first BEFORE attempting to start pumps or compressors. To reverse rotation, interchange any two of the main incoming power leads.

8. Be sure system is fully charged with refrigerant (see Check Refrigerant Charge section on this page).

9. If unit is a brine unit, check to ensure proper brine concentration is used to prevent freezing.

10. Verify proper operation of cooler and hydronic package heaters (if installed). Heaters operate at the same voltage as the main incoming power supply and are single phase. Heater current is approximately 0.4 amps for 460 and 575 v units. Heater current is approximately 0.8 amps for 230 v units.
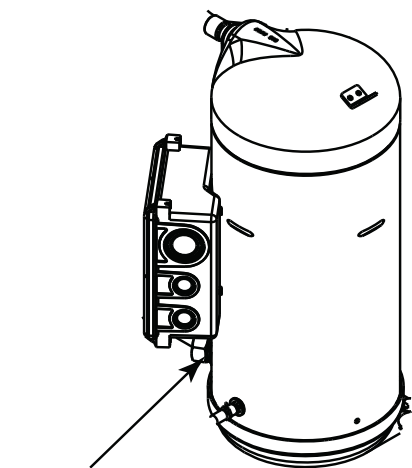
OIL SIGHTGLASS
Fig. 23 — Sight Glass Location

START-UP AND OPERATION

NOTE: Refer to Start-Up Checklist on pages CL-1 to CL-10.

Actual Start-Up — Actual start-up should be done only under supervision of a qualified refrigeration mechanic.

1. Be sure all service valves are open.

2. Using the scrolling marquee display, set leaving-fluid set point (*Set Points→COOL→CSP.1*). No cooling range adjustment is necessary.

3. Start chilled fluid pump (if not configured for cooler pump control).

4. Turn ENABLE/OFF/REMOTE CONTACT switch to ENABLE position.

5. Allow unit to operate and confirm that everything is functioning properly. Check to see that leaving fluid temperature agrees with leaving set point (*Set Points→COOL →CSP.1*) or (*Set Points→COOL →CSP.2*), or if reset is used, with the control point (*Run Status→VIEW →CTPT*).

6. Check the cooler leaving chilled water temperature to see that it remains well above 32 F (0° C), or the brine freezing point if the unit is a medium temperature brine unit.

7. Recheck compressor oil level (see Oil Charge section).

Check Refrigerant Charge — All 30RAP units are shipped with a complete operating charge of R-410A and should be under sufficient pressure to conduct a leak test after installation. If there is no system pressure, admit nitrogen until a pressure is observed and then proceed to test for leaks. After leaks are repaired, the system must be dehydrated.

All refrigerant charging should be done through the ¼-in. Schraeder connection on the liquid line. Do NOT add refrigerant charge through the low-pressure side of the system. If complete charging is required, weigh in the appropriate charge for the circuit as shown on the unit nameplate. If partial charging is required, operate circuit at full load and use an accurate temperature sensor on the liquid line as it enters the EXV. Use the Temperatures mode on the scrolling marquee display to show the circuit saturated condensing temperature (*Temperatures→CIR.A→SCT.A*) or (*Temperatures→CIR.B →SCT.B*). Charging is most accurate at saturated discharge temperatures of 120 to 125 F (49 to 52 C). Block condenser airflow as required to reach this temperature range. Add refrigerant until the system subcooling (*SCT.A* or *SCT.B* minus liquid line temperature entering EXV) is approximately 15 to 17 F (–9.4 to –8.3 C). Refrigerant VAPOR only may be added to a circuit through the $\frac{1}{4}$-in. suction Schraeder connection on the suction line.

Table 28 — Minimum Cooler Flow Rates and Minimum Loop Volume

30RAP SIZE	MINIMUM COOLER FLOW RATE (gpm)	MAXIMUM COOLER FLOW RATE (gpm)	MINIMUM COOLER FLOW RATE (l/s)	MAXIMUM COOLER FLOW RATE (l/s)
010	13	50	0.8	3.2
015	17	66	1.1	4.2
018	20	78	1.3	4.9
020	23	91	1.5	5.7
025	28	112	1.8	7.1
030	33	133	2.1	8.4
035	41	164	2.6	10.3
040	47	186	3.0	11.7
045	53	209	3.3	13.2
050	57	228	3.6	14.4
055	63	251	4.0	15.8
060	68	270	4.3	17.0

Operating Limitations

TEMPERATURES (See Table 29 for 30RAP standard temperature limits).

High Cooler Leaving Chilled Water (Fluid) Temperatures (LCWT) — During start-up with cooler LCWT above approximately 60 F (16 C), the unit expansion valve will limit suction pressure to approximately 90 psig (620 kPa) to avoid overloading the compressor.

Low Cooler LCWT — For standard units, the LCWT must be no lower than 40 F (4.4 C). If the unit is the factory-installed optional medium temperature brine unit, the cooler LCWT can go down to 15 F (–9.4 C).

Table 29 — Temperature Limits for Standard 30RAP Units

UNIT SIZE 30RA	010-030		035-060	
Temperature	F	C	F	C
Maximum Ambient Temperature	120	49	120	49
Minimum Ambient Temperature	45	7	32	0
Maximum Cooler EWT*	95	35	95	35
Maximum Cooler LWT	70	21	70	21
Minimum Cooler LWT†	40	4.4	40	4.4

LEGEND

EWT — Entering Fluid (Water) Temperature
LWT — Leaving Fluid (Water) Temperature

*For sustained operation, EWT should not exceed 85 F (29.4 C).
†Unit requires modification below this temperature.

LOW-AMBIENT OPERATION — If operating temperatures below 45 F (7 C) on size 018-030 units, and 32 F (0° C) on size 035-060 units are expected, accessory Motormaster® V control must be installed. Operating temperatures can go as low as –20 F (–29 C) on size 010 and 015 units, as standard. Installation of wind baffles is also required. Refer to separate installation instructions for operation using this accessory. Contact your Carrier representative for details.

VOLTAGE — ALL UNITS

Main Power Supply — Minimum and maximum acceptable supply voltages are listed in the Installation Instructions.

Unbalanced 3-Phase Supply Voltage — Never operate a motor where a phase imbalance between phases is greater than 2%. To determine percent voltage imbalance:

$$\% \text{ Voltage Imbalance} = 100 \text{ x } \frac{\text{max voltage deviation from avg voltage}}{\text{average voltage}}$$

The maximum voltage deviation is the largest difference between a voltage measurement across 2 legs and the average across all 3 legs.

Example: Supply voltage is 240-3-60.

AB = 243 v
BC = 236 v
AC = 238 v
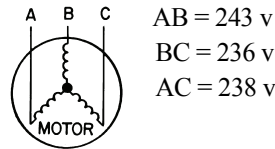
1. Determine average voltage:

$$\text{Average voltage } = \frac{243 + 236 + 238}{3}$$

$$= \frac{717}{3}$$

$$= 239$$

2. Determine maximum deviation from average voltage:

(AB) 243 – 239 = 4 v
(BC) 239 – 236 = 3 v
(AC) 239 – 238 = 1 v

Maximum deviation is 4 v.

3. Determine percent voltage imbalance:

$$\% \text{ Voltage Imbalance} = 100 \text{ x } \frac{4}{239}$$

$$= 1.7\%$$

This voltage imbalance is satisfactory as it is below the maximum allowable of 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately. Do not operate unit until imbalance condition is corrected.

Control Circuit Power — Power for the control circuit is supplied from the main incoming power through a factory-installed control power transformer (TRAN1) for all models. Field wiring connections are made to the LVT.

OPERATION SEQUENCE

During unit off cycle, the control monitors the outdoor air temperature. If the ambient temperature drops below 40 F (4.4 C), cooler and hydronic system heaters (if either are factory installed) are energized. If power is maintained to the chiller and the EMERGENCY ON/OFF switch is left in the OFF position, these heaters are also energized.

The unit is started by putting the ENABLE/OFF/REMOTE CONTACT switch in the ENABLE or REMOTE CONTACT position. When the unit receives a call for cooling (either from the internal control or CCN network command or remote contact closure), the unit stages up in capacity to maintain the leaving fluid set point. The first compressor starts $1^1/_2$ to 3 minutes after the call for cooling.

The lead circuit can be specifically designated on all models or selected based on compressor run hours and starts depending on field configuration. The unit control will override this selection under certain starting conditions to properly maintain oil return to the compressors. In general, on dual compressor

circuits, the control will most often start the A1 or B1 compressor first, especially after long off periods. The MBB controls fan stages to maintain the head pressure set point and will automatically adjust unit capacity as required to keep compressors from operating outside of the specified envelope. There are no pumpout or pumpdown sequences on these chillers.

For all units, if temperature reset is being used, the unit controls to a higher leaving-fluid temperature as the building load reduces. If demand limit is used, the unit may temporarily be unable to maintain the desired leaving-fluid temperature because of imposed power limitations.

SERVICE

> ⚠ **WARNING**
>
> Electrical shock can cause personal injury and death. Shut off all power to this equipment during service. There may be more than one disconnect switch. Tag all disconnect locations to alert others not to restore power until work is completed.

Electronic Components

CONTROL COMPONENTS — Unit uses an advanced electronic control system that normally does not require service. For details on controls refer to Operating Data section.

Access to the compressors is through latched panels from beneath the control box on all models or from opposite the coil side (sizes 010-030 only). The front door(s) provide access to the compressor(s) and all components of the refrigeration system. For size 010-030 units, access to the controls is through the upper latched outer door above the compressor access door. Similarly, the upper center latched door on sizes 035-060 gives access to the controls. Inner panels are secured in place and should not be removed unless all power to the chiller is off.

Electronic Expansion Valve (EXV) — See Fig. 24

for a cutaway view of the EXV. High-pressure liquid refrigerant enters valve through the top. As refrigerant passes through the orifice, pressure drops and refrigerant changes to a 2-phase condition (liquid and vapor). The electronic expansion valve operates through an electronically controlled activation of a stepper motor. The stepper motor stays in position, unless power pulses initiate the two discrete sets of motor stator windings for rotation in either direction. The direction depends on the phase relationship of the power pulses.

The motor directly operates the spindle, which has rotating movements that are transformed into linear motion by the transmission in the cage assembly. The valve includes a positive shut-off when closed.

There are two different EXVs. See Table 30 for number of steps. The EXV motor moves at 200 steps per second. Commanding the valve to either 0% or 100% will add extra steps to the move, to ensure the value is open or closed completely.

Table 30 — EXV Steps

UNIT SIZE 30RAP	EXV STEPS
010-020	1596
025,030	2500
035-045	1596
050-060	2500

The EXV board controls the valve. Each circuit has a thermistor located in a well in the suction manifold before the compressor. Suction pressure as measured by the suction pressure transducer is converted to a saturated suction temperature. The thermistor measures the temperature of the superheated gas entering the compressor and the pressure transducer

determines the saturated temperature of suction gas. The difference between the temperature of the superheated gas and the saturated suction temperature is the superheat. The EXV board controls the position of the electronic expansion valve stepper motor to maintain superheat set point.

The MBB controls the superheat leaving cooler to approximately 9° F (5° C). Because EXV status is communicated to the main base board (MBB) and is controlled by the EXV boards, it is possible to track the valve position. The unit is then protected against loss of charge and a faulty valve. Just prior to compressor start, the EXV will open. At low ambient temperatures the EXV is closed at start up. After initialization period, valve position is tracked by the EXV board by constantly monitoring the amount of valve movement.

The EXV is also used to limit cooler saturated suction temperature to 50 F (10 C). This makes it possible for the chiller to start at higher cooler fluid temperatures without overloading the compressor. This is commonly referred to as MOP (maximum operating pressure). At ambient temperatures above 110 F, MOP is bypassed at start-up to prevent charge backup in the condenser.

If it appears that the EXV module is not properly controlling circuit operation to maintain correct superheat, there are a number of checks that can be made using test functions and initialization features built into the microprocessor control. See the EXV Troubleshooting Procedure section to test EXVs.

EXV Troubleshooting Procedure — Follow steps

below to diagnose and correct EXV/economizer problems.

Check EXV motor operation first. Switch the Enable/Off/ Remote Contact (EOR) switch to the Off position. Press `ESCAPE` on the Navigator™ display until 'Select a menu item' appears on the display. Use the arrow keys to select the Service Test mode. Press `ENTER`. The display will be:

```
      > TEST          OFF
        OUTS
        COMP
```

Press `ENTER` (password entry may be required) and use `▲` to change 'OFF' to 'ON'. Switch the EOR switch to Enable. The Service Test mode is now enabled. Move the pointer down to the OUTS sub-mode and press `ENTER`. Move the pointer to item **EXV.A** or **EXV.B** as needed. Press `ENTER` and the valve position will flash. Use `▲` to select 100% valve position (hold `▲` for quick movement) and press `ENTER`.

The technician should be able to feel the actuator moving by placing a hand on the EXV. A sight glass is located on the valve body to verify that the sleeve is moving to expose/cover slots in the orifice. A hard knocking should be felt from the actuator when it reaches the top of its stroke (can be heard if surroundings are relatively quiet). Press `ENTER` again twice if necessary to confirm this. To close the valve, press `ENTER`, select 0% with `▼` and press `ENTER`. The actuator should knock when it reaches the bottom of its stroke. If it is believed that the valve is not working properly, continue with the checkout procedure below:

Check the EXV output signals at appropriate terminals on the EXV module (see Fig. 25). Connect positive test lead to red wire (EXV-J6 terminal 3 for Circuit A, EXV-J7 terminal 3 for Circuit B). Set meter to approximately 20 vdc. Using the Service Test procedure above, move the valve output under test to 100%. DO NOT short meter leads together or pin 3 to any other pin as board damage will occur.
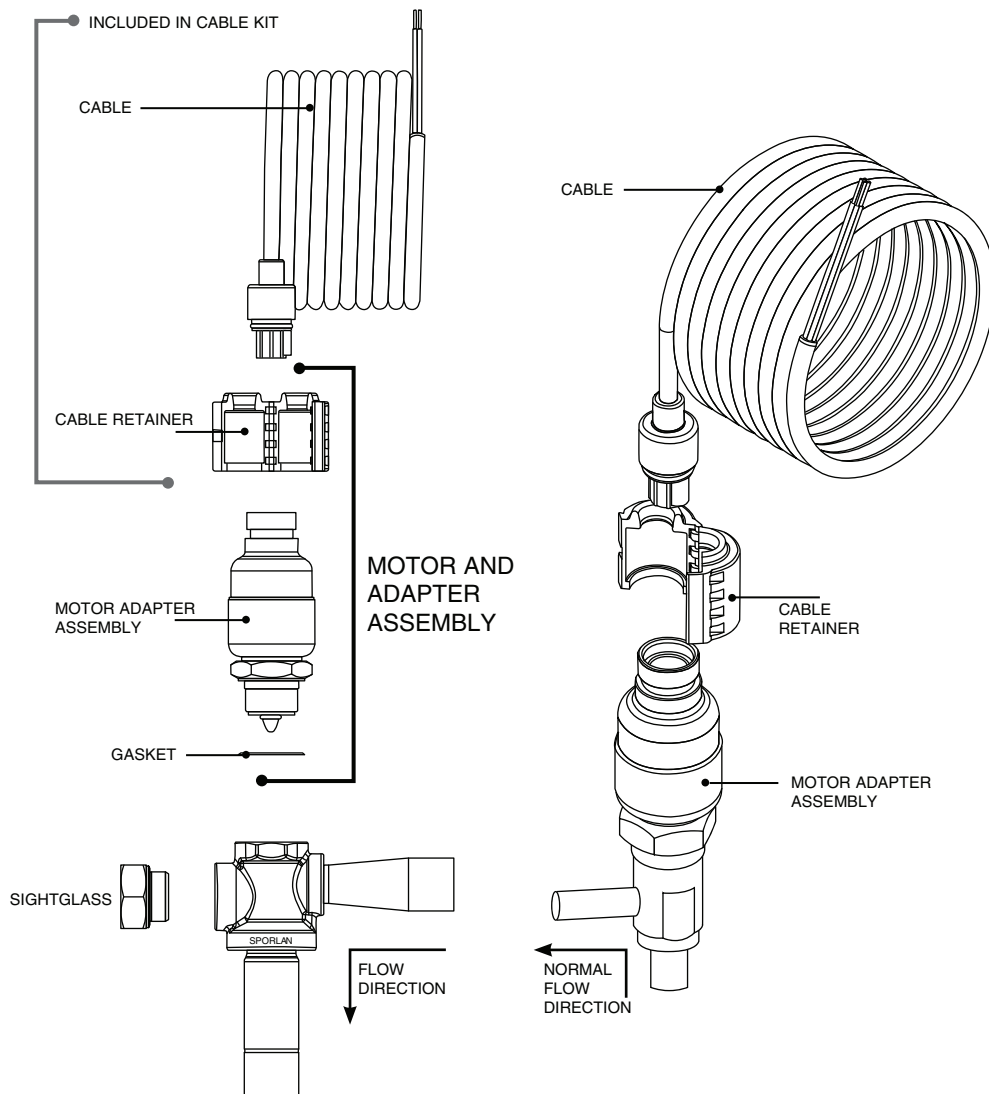
Fig. 24 — Electronic Expansion Valve Details

During the next several seconds, carefully connect the negative test lead to pins 1,2,4 and 5 in succession (plug J6 for Circuit A, plug J7 for Circuit B). Digital voltmeters will average this signal and display approximately 6 vdc. If it remains constant at a voltage other than 6 VDC or shows 0 volts, remove the connector to the valve and recheck.

Press ENTER and select 0% to close the valve. Check the 4 position DIP switch on the board (all switches should be set to On). If a problem still exists, replace the EXV module. If the reading is correct, the expansion valve and EXV wiring should be checked. Check the EXV terminal strip and interconnecting wiring.

1. Check color coding and wire connections. Make sure they are connected to the correct terminals at the EXV driver and EXV plug and that the cables are not crossed.

2. Check for continuity and tight connection at all pin terminals.

3. Check the resistance of the EXV motor windings. Remove the EXV module plug (J6 for Circuit A, J7 for Circuit B) and check the resistance of the two windings between pins 1 and 2 for one winding and pins 4 and 5 for the other winding (see Fig. 25). The resistance should be 100 ohms ± 10 ohms.

FIELD SERVICING INSTRUCTIONS — The EXV valves on sizes 025, 030, 050-060 can be serviced. The EXV valves on all other sizes are hermetic and cannot be disassembled for installation or during service, however, the cable and retainer may be replaced if necessary. Motor kits for the EXV valve are available as replacement parts.

To remove the valve from the system, perform the following procedure:

1. Be sure the refrigerant has been recovered from the circuit.

2. Disconnect the line voltage to the valve controller. Disconnect the valve wires from the controller.

3. If the motor fails to operate properly, check the resistance of each motor phase. Resistance between black and white leads or between the red and green leads should be approximately 100 ohms. Differences of more than 10% between phases indicate a defective motor. Resistance between black and red, or any lead and piping, should be infinite or "open". Any resistance reading will indicate a shorted winding and the valve will need to be replaced.

4. The output of the controller to the valve can be tested with the following procedure:

   a. Disconnect supply voltage to the controller.
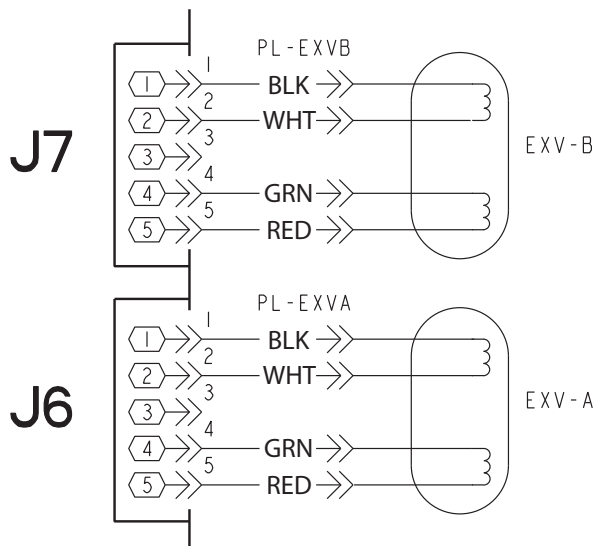
Fig. 25 — EXV Cable Connections to EXV Module

    b. Place a digital voltmeter, on 20-volt AC scale, across the black and white terminals on the controller. Restore power to the controller. For at least 7 seconds, the voltmeter should read approximately 12 to 14 volts. Significant differences mean the controller is defective or not properly configured for the EXV valve.

    c. Repeat the procedure in Step b above using the red and green terminals on the controller. If the controller responds properly, then the wiring may be damaged or the valve may be plugged with debris or otherwise obstructed.

    d. The EXV valves on sizes 025, 030, 050-060 may be disassembled for cleaning, inspection or motor assembly replacement.

VALVE REPLACEMENT — The valve may be replaced by unsoldering or cutting the piping. A tubing cutter must be used to prevent creating contaminants in the piping.

VALVE REASSEMBLY — Perform the following procedure to reassemble the EXV valve:

1. Use Service Test to open the EXV to 100%. This will retract the white polyester driver/piston fully into the driver guide. Remove power from the valve or controller.

2. Lightly oil the threads, and gasket or knife-edge on the new motor adaptor. Carefully seat the adaptor on the valve body or engage and tighten the lock nut if used. Lock nuts should be torqued to approximately 45 ft-lb. One eighth turn more than hand tight is sufficient to achieve a leak proof seal on knife-edge joints.

3. After the motor is tightened, the cable should be replaced on the valve. Care should be taken to ensure engagement of the alignment key. Snap on the cable retainer.

4. Pressurize the system and check for leaks.

5. Reapply power to the *Comfort*Link™ controller. Since, during service, valve position as calculated by the controller will be lost, the controller should be initialized at least twice. In some instances, cycling power to the controller will accomplish this.

> ⚠ **CAUTION**
>
> If the existing motor has been removed for inspection or cleaning, be sure that the piston is fully retracted into the motor assembly before installation on the valve. Failure to do so will permanently damage the drive and motor. Replacement motor assemblies are shipped in the retracted position and may be installed as received.

Compressor Replacement (Refer to Fig. 26 and 27) — All models contain scroll compressors and have from one to four compressors. The size 010-030 units are a single refrigeration circuit while sizes 035-060 are dual circuit. A compressor is most easily removed from the front of the unit, depending on where clearance space was allowed during unit installation.

    Remove the junction box cover bolts and disconnect the compressor power and ground connections. Remove the cable from the compressor junction box. Remove the connections from the high-pressure switch. Knock the same holes out of the new compressor junction box and install the cable connectors from the old compressor.

    The compressors are bolted to rails, which are in turn bolted to the unit basepan for all sizes except 010 and 015 which are directly bolted to the basepan. Remove the 4 bolts holding the compressor to the rail on the basepan. Save the mounting hardware for use with the new compressor. Carefully cut the compressor suction and discharge lines with a tubing cutter as close to the compressor as feasible. Remove high-pressure switch and pressure transducer(s) if required for compressor removal. Lift one corner of the compressor at a time and remove all the rubber mounting grommets (single compressor circuits) or steel spacers (dual compressor circuits). Remove the old compressor from the unit.

    Slide the new compressor in place on the basepan. Lifting one side of the compressor at a time, replace all of the compressor mounting grommets. Using new tubing as required, reconnect compressor suction and discharge lines. Using hardware saved, reinstall the mounting bolts and washers through the compressor feet. Using proper techniques, braze suction and discharge lines and check for leaks. Reconnect oil equalization line on dual compressor circuit models.

    Reconnect the compressor power connections and high-pressure switch wiring as on the old compressor. Refer to Fig. 26 and 27. Following the installation of the new compressor, tighten all hardware to the following specifications. (See Table 31.)

Table 31 — Unit Torque Specification

FASTENER	RECOMMENDED TORQUE
Compressor Mounting Bolts	7 to 10 ft-lb (9.5 to 13.5 N-m)
Compressor Power Connections	24 to 28 in.-lb (2.7- to 3.2 N-m)
Compressor Ground Terminal Connections	14 to 18 in.-lb (1.6 to 2.0 N-m)

Cooler

BRAZED-PLATE COOLER HEAT EXCHANGER REPLACEMENT — Brazed-plate heat exchangers cannot be repaired if they develop a leak. If a leak (refrigerant or water) develops, the heat exchanger **must be** replaced. To replace a brazed-plate heat exchanger:

1. Check that the replacement heat exchanger is the same as the original heat exchanger. The unit insulation covers the manufacturer's part number. Make sure the depths of the replacement and original cooler heat exchangers are the same.

2. Disconnect the liquid-in and liquid-out connections at the heat exchanger.

3. Recover the refrigerant from the system, and unsolder the refrigerant-in and refrigerant-out connections.

4. Remove the old heat exchanger. The replacement heat exchanger is supplied fully insulated. It also includes a cooler heater. Use of the heater is not required unless the original cooler contained a factory installed heater.

5. Install the replacement heat exchanger in the unit and attach the mounting bracket hardware to the fan uprights (sizes 010-030) or to the bottom bracket (sizes 035-060) using the hardware removed in Step 4. Reconnect the cooler heater if required. For sizes 010-025, torque the bolts to 7-10 ft-lb. For sizes 030-060, torque the bolts to 30-50 ft-lb.

6. *Carefully* braze the refrigerant lines to the connections on the heat exchanger. Lines should be soldered using silver as the soldering material with a minimum of 45% silver. Keep the temperature below 1472 F (800 C) under normal soldering conditions (no vacuum) to prevent the copper solder of the brazed plate heat exchanger from changing its structure. Failure to do so can result in internal or external leakage at the connections which cannot be repaired. Braze the liquid lines with a heat sink around the expansion valve to protect it from excess heat.

7. Reconnect the water/brine lines.

8. Dehydrate and recharge the unit. Check for leaks.

BRAZED-PLATE COOLER HEAT EXCHANGER CLEANING — Brazed-plate heat exchangers must be cleaned chemically. A professional cleaning service skilled in chemical cleaning should be used. Use a weak acid (5% phosphoric acid, or if the heat exchanger is cleaned frequently, 5% oxalic acid). Pump the cleaning solution through the exchanger, preferably in a backflush mode. After cleaning, rinse with large amounts of fresh water to dispose of all the acid. Cleaning materials must be disposed of properly.

The factory-installed strainer screen in front of the water/brine inlets of the heat exchangers should be cleaned periodically, depending on condition of the chiller water/brine.

Oil Charge

⚠ CAUTION

The compressor in a Puron® refrigerant (R-410A) system uses a polyol ester (POE) oil. This is extremely hygroscopic, meaning it absorbs water readily. POE oils can absorb 15 times as much water as other oils designed for HCFC and CFC refrigerants. Take all necessary precautions to avoid exposure of the oil to the atmosphere. Failure to do so could result in possible equipment damage.

Puron refrigerant systems use a polyol ester (POE) oil. Use only Carrier approved compressor oil. Oil should be visible in compressor oil sight glass. An acceptable oil level is from $1/8$ to $3/8$ of sight glass. All compressors must be off when checking oil level. Recommended oil level adjustment method is as follows:

ADD OIL — Recover charge from the unit. Add oil to suction line Schrader valve on tandem compressors sets and the compressor Schrader on the trio's and single compressor circuits. (See Fig. 26 and 27.) When oil can be seen at the bottom of the sight glass, add oil in 5 oz increments which is approximately $1/8$ in oil level. Run all compressors for 20 minutes then shut off to check oil level. Repeat procedure until acceptable oil level is present.

NOTE: Use only Carrier approved compressor oil. Approved sources are:

Totaline . . . . .3MAF POE, P903-1601

Mobil . . . . .EAL Arctic 32-3MA
Uniqema RL32-3MAF

Do not reuse oil that has been drained out, or oil that has been exposed to atmosphere.

Microchannel Heat Exchanger (MCHX) Condenser Coil Maintenance and Cleaning Recommendations

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⚠ CAUTION

Do not apply any chemical cleaners to MCHX condenser coils. These cleaners can accelerate corrosion and damage the coil.

Routine cleaning of coil surfaces is essential to maintain proper operation of the unit. Elimination of contamination and removal of harmful residues will greatly increase the life of the coil and extend the life of the unit. The following steps should be taken to clean MCHX condenser coils:

1. Remove any foreign objects or debris attached to the coreface or trapped within the mounting frame and brackets.

2. Put on personal protective equipment including safety-glasses and/or face shield, waterproof clothing and gloves. It is recommended to use full coverage clothing.

3. Start high pressure water sprayer and purge any soap or industrial cleaners from sprayer before cleaning condenser coils. Only clean, potable water is authorized for cleaning condenser coils.

4. Clean condenser face by spraying the core steady and uniformly from top to bottom while directing the spray straight toward the core. Do not exceed 900 psig or 30 degree angle. The nozzle must be at least 12 in. from the core face. Reduce pressure and use caution to prevent damage to air centers.

⚠ CAUTION

Excessive water pressure will fracture the braze between air centers and refrigerant tubes.

Check Refrigerant Feed Components

FILTER DRIER — The function of the filter drier is to maintain a clean, dry system. The moisture indicator (described below) indicates any need to change the filter drier. The filter drier is a sealed-type drier. When the drier needs to be changed, the entire filter drier must be replaced.

NOTE: Dual circuit (035-060 sizes) units have 1 filter drier per circuit.

MOISTURE-LIQUID INDICATOR — The indicator is located immediately ahead of the TXV to provide an indication of the refrigerant moisture content. It also provides a sight glass for refrigerant liquid. Clear flow of liquid refrigerant (*at full unit loading*) indicates sufficient charge in the system. Bubbles in the sight glass (*at full unit loading*) indicate an undercharged system or the presence of noncondensables. Moisture in the system, measured in parts per million (ppm), changes the color of the indicator as follows:

Green (safe) —Moisture is below 75 ppm
Yellow-Green (caution) — 75 to 150 ppm
Yellow (wet) — above 150 ppm

The unit must be in operation at least 12 hours before the moisture indicator gives an accurate reading, and must be in contact with *liquid* refrigerant. At the first sign of moisture in the system, change the corresponding filter drier.

NOTE: Dual circuit (035-060 sizes) units have one indicator per circuit.
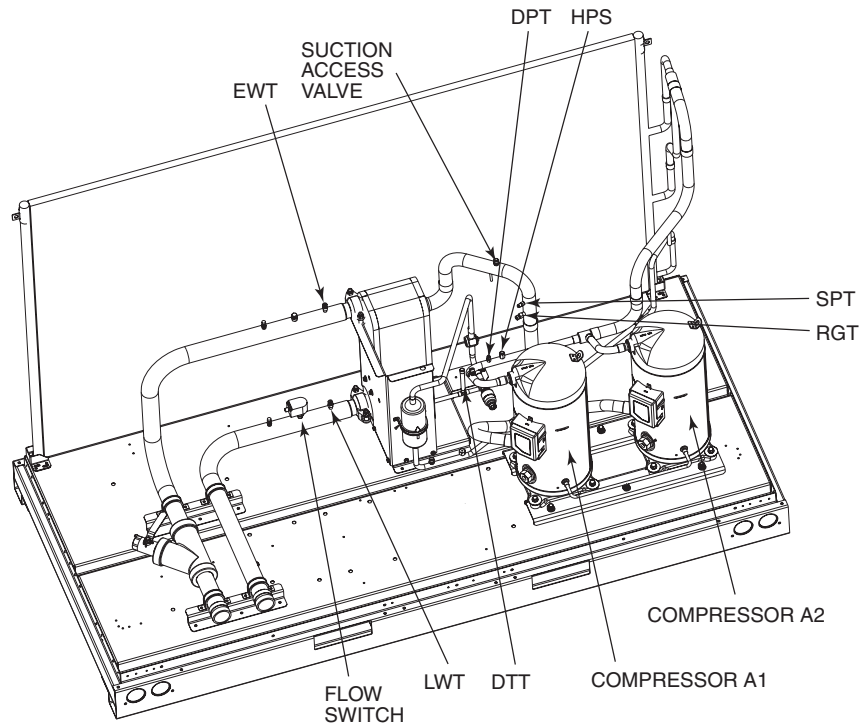
Fig. 26 — Compressor Location — 30RAP010-030
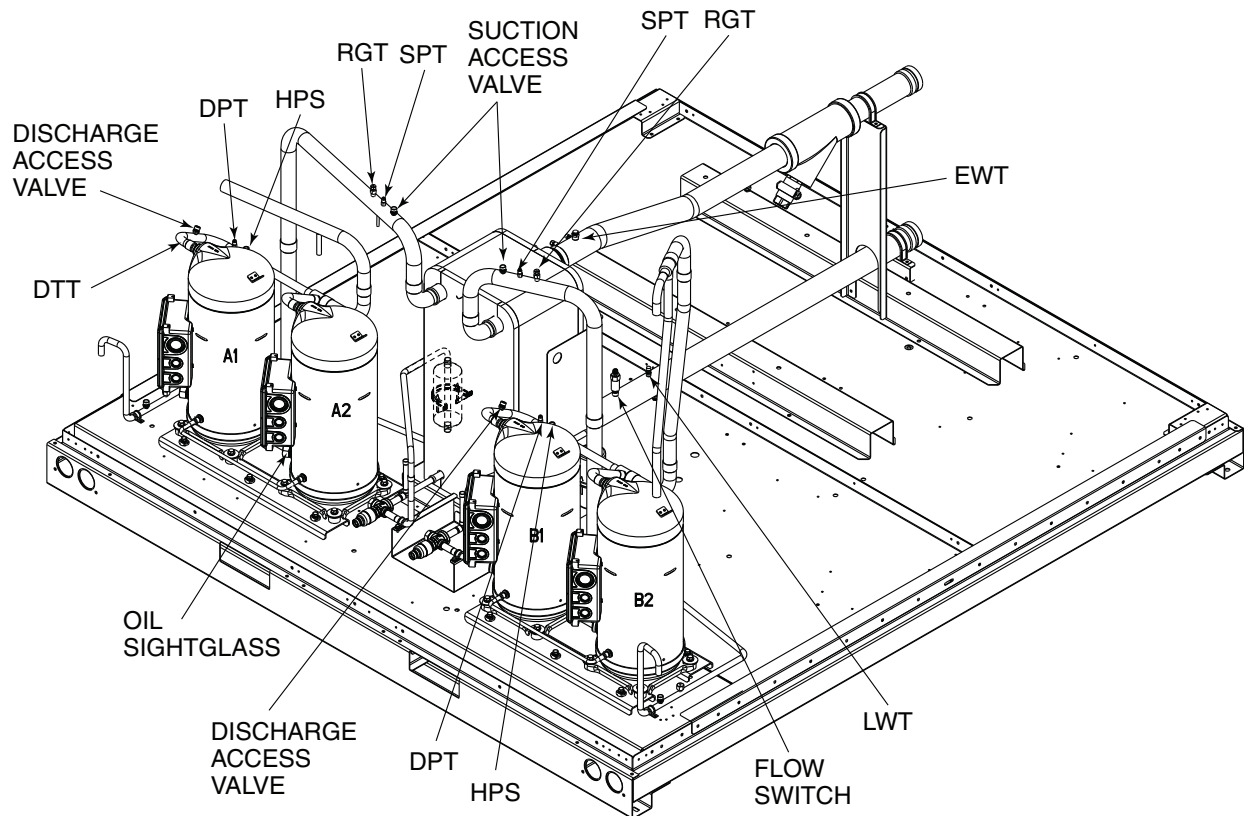
Fig. 27 — Compressor Location — 30RAP035-060

LEGEND FOR FIG. 26 AND 27

DPT	—	Discharge Pressure Thermostat
DTT	—	Discharge Temperature Thermistor
EWT	—	Entering Water Thermistor
HPS	—	High Pressure Switch
LWT	—	Leaving Water Thermistor
RGT	—	Return Gas Thermistor
SPT	—	Suction Pressure Transducer

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MINIMUM LOAD VALVE — On units equipped with the factory-installed capacity reduction option, a solenoid valve and discharge bypass valve (minimum load valve) are located between the discharge line and the cooler entering-refrigerant line. The MBB cycles the solenoid to perform minimum load valve function and the discharge bypass valve modulates to the suction pressure set point and the valve.

The amount of capacity reduction achieved by the minimum load valve is not adjustable. The total unit capacity with the minimum load valve is shown in Table 19.

PRESSURE RELIEF DEVICES — All units have one pressure relief device per circuit located in the liquid line which relieves at 210 F (100 C).

Check Unit Safeties

HIGH-PRESSURE SWITCH — A high-pressure switch is provided to protect each compressor and refrigeration system from unsafe high pressure conditions. See Table 32 for high-pressure switch settings.

The high-pressure switch is mounted in the discharge line of each circuit. If an unsafe, high-pressure condition should exist, the switch opens and shuts off the affected circuit. The CSB senses the compressor feedback signal and generates an appropriate alarm. The MBB prevents the circuit from restarting until the alert condition is reset. The switch should open at the pressure corresponding to the appropriate switch setting as shown in Table 32.

Table 32 — Factory Settings, High-Pressure Switch (Fixed)

UNIT	CUTOUT		CUT-IN	
	Psig	kPa	Psig	kPa
30RA	650	4482	500	3447

Clear the alarm using the scrolling marquee display as described on page 63. The unit should restart after the compressor anti-short-cycle delay, built into the unit control module, expires.

PRESSURE TRANSDUCERS — Each refrigerant circuit is equipped with a suction and discharge pressure transducer. These inputs to the MBB are not only used to monitor the status of the unit, but to also maintain operation of the chiller within the compressor manufacturer's specified limits. The input to the MBB from the suction pressure transducer is also used to protect the compressor from operating at low pressure conditions and low superheat conditions. In some cases, the unit may not be able to run at full capacity. The control module will automatically reduce the capacity of a circuit as needed to maintain specified maximum/minimum operating pressures.

COOLER FREEZE-UP PROTECTION

⚠ WARNING

On medium temperature brine units, the anti-freeze solution must be properly mixed to prevent freezing at a temperature of at least 15 F (8.3 C) below the leaving-fluid temperature set point. Failure to provide the proper anti-freeze solution mixture is considered abuse and may impair or otherwise negatively impact the Carrier warranty.

The main base board (MBB) monitors leaving fluid temperature at all times. The MBB will rapidly remove stages of capacity as necessary to prevent freezing conditions due to the rapid loss of load or low cooler fluid flow.

When the cooler is exposed to lower ambient temperatures (34 F [1° C] or below), freeze-up protection is required using inhibited ethylene or propylene glycol.

HEATER CABLE — Optional factory-installed cooler and/or hydronic package heaters are cycled based on the input from the outside-air temperature sensor. These heaters, when installed, are designed to protect the cooler and/or hydronic package from freezing down to –20 F (–29 C). Power for these heaters is supplied from the main unit power.

The input from the low pressure transducer provides a back-up cooler freeze protection package. The MBB shuts down the unit when a low pressure condition exists that could cause the cooler to freeze up.

⚠ CAUTION

Do not disconnect main unit power when servicing compressor(s) if ambient temperature is below 40 F (4.4 C). The compressors have either a single circuit breaker or multiple circuit breakers which can be used to shut off power to the compressors. If power to the unit must be off for a prolonged period, drain the cooler, hydronic package (if installed) and internal piping. Add glycol according to Winter Shutdown Step 2 below.

WINTER SHUTDOWN — At the end of the cooling season:
1. Drain the fluid from the cooler, hydronic package (if installed) and internal piping.
2. Fill the cooler and hydronic package with at least 2 gallons (7.6 L) of inhibited propylene glycol or other suitable inhibited antifreeze solution to prevent any residual water in the cooler and hydronic package/piping from freezing.
3. At the beginning of the next cooling season, refill the cooler and add the recommended inhibitor.

Thermistors — Electronic control uses up to five 5 kΩ thermistors to sense temperatures used to control operation of the chiller. Thermistors EWT, LWT, RGTA, RGTB, and OAT are identical in their temperature and voltage drop performance. The SPT space temperature thermistor has a 10 kΩ input channel and it has a different set of temperature vs. resistance and voltage drop performance. Resistance at various temperatures are listed in Tables 33-37. For dual chiller operation, a dual chiller sensor is required which is a 5 kΩ thermistor. When a digital compressor is used, a DTT (digital temperature thermistor) is used. The DTT is an 86 kΩ thermistor.

REPLACING THERMISTORS (EWT, LWT, RGT) — Add a small amount of thermal conductive grease to the thermistor well and end of probe. For all probes, tighten the retaining nut ¼ turn past finger tight. See Fig. 28.

THERMISTOR/TEMPERATURE SENSOR CHECK — A high quality digital volt-ohmmeter is required to perform this check.
1. Connect the digital voltmeter across the appropriate thermistor terminals at the J8 terminal strip on the Main Base Board (see Fig. 29).
2. Using the voltage reading obtained, read the sensor temperature from Tables 33-37.
3. To check thermistor accuracy, measure temperature at probe location with an accurate thermocouple-type temperature measuring instrument. Insulate thermocouple to avoid ambient temperatures from influencing reading. Temperature measured by thermocouple and temperature determined from thermistor voltage reading should be close, ± 5° F (3° C) if care was taken in applying thermocouple and taking readings.

If a more accurate check is required, unit must be shut down and thermistor removed and checked at a known temperature (freezing point or boiling point of water) using either voltage drop measured across thermistor at the J8 terminal, by determining the resistance with chiller shut down and thermistor

disconnected from J8. Compare the values determined with the value read by the control in the Temperatures mode using the scrolling marquee display.

Pressure Transducers — The suction and discharge transducers are different part numbers and can be distinguished by the color of the transducer body, suction (yellow) and discharge (red). No pressure transducer calibration is required. The transducers operate on a 5 vdc supply, which is generated by the main base board (MBB). See Fig. 29 for transducer connections to the J8 connector on the MBB.

TROUBLESHOOTING — If a transducer is suspected of being faulty, first check supply voltage to the transducer. Supply voltage should be 5 vdc ± 0.2 v. If supply voltage is correct, compare pressure reading displayed on the scrolling marquee display module against pressure shown on a calibrated pressure gauge. Pressure readings should be within ± 15 psig. If the two readings are not reasonably close, replace the pressure transducer.

Chilled Water Flow Switch — A factory-installed flow switch is installed in the leaving fluid piping for all units without the factory-installed hydronic package. See Fig. 30. Units with the optional hydronic package have the flow switch installed in the entering fluid piping. This is a thermal-dispersion flow switch with no field adjustments. The switch is set for approximately 0.5 ft/sec of flow. The sensor tip houses two thermistors and a heater element. One thermistor is located in the sensor tip, closest to the flowing fluid. This thermistor is used to detect changes in the flow velocity of the liquid. The second thermistor is bonded to the cylindrical wall and is affected only by changes in the temperature of the liquid. The thermistors are positioned to be in close contact with the wall of the sensor probe and, at the same time, to be kept separated from each other within the confines of the probe.

In order to sense flow, it is necessary to heat one of the thermistors in the probe. When power is applied, the tip of the probe is heated. As the fluid starts to flow, heat will be carried away from the sensor tip. Cooling of the first thermistor is a function of how fast heat is conducted away by the flowing liquid.

The difference in temperature between the two thermistors provides a measurement of fluid velocity past the sensor probe. When fluid velocity is high, more heat will be carried away from the heated thermistor and the temperature differential will be small. As fluid velocity decreases, less heat will be taken from the heated thermistor and there will be an increase in temperature differential.

When unit flow rate is above the minimum flow rate, then the output is switched on, sending 24 vac to the MBB to prove flow has been established.

For recommended maintenance, check the sensor tip for build-up every 6 months. Clean the tip with a soft cloth. If

necessary, build-up (e.g., lime) can be removed with a common vinegar cleansing agent.

The flow sensor cable is provided with (3) LEDs that indicate if 24 vac power is present and also status of the switch contacts. The LEDs are as follows:

• Green LED ON – 24 vac present
• One Yellow LED ON – Flow sensor switch OPEN
• Two Yellow LED ON – Flow sensor switch CLOSED

If nuisance trips of the sensor are occurring, follow the steps below to correct the situation:

1. Check to confirm that the factory installed strainer is clean. Use the blow-down valve provided or remove the screen and clean it. For the case of VFD controlled pumps, ensure that the minimum speed setting has not been changed.
2. Measure the pressure drop across the cooler or cooler/pump system and compare this to the system requirements.
3. Verify that cable connections at the switch and at the terminal block are secure.
4. For factory-installed hydronic systems, verify that:
   • All air has been purged from the system.
   • Circuit setter balance valve has been correctly set.
5. Pump impeller has been improperly trimmed and is not providing sufficient flow.
6. Wrong pump motor rotation. Pump must rotate clockwise when viewed from motor end of pump.

Strainer — Periodic factory-installed strainer cleaning is required. Pressure drop across strainer in excess of 3 psi (21 kPa) indicates the need for cleaning. Normal (clean) pressure drop is approximately 1 psi (6.9 kPa). Open the factory-installed blowdown valve to clean the strainer. If required, shut the chiller down and remove the strainer screen to clean. When strainer has been cleaned, enter 'YES' for Strainer Maintenance Done (***Run Status→PM→S.T.MN***).

Condenser Fans — Each fan is supported by a formed wire mount bolted to a fan deck and covered with a wire guard.

METAL FANS — The exposed end of fan motor shaft is protected from weather by grease and a rubber boot. If fan motor must be removed for service or replacement, be sure to re-grease fan shaft and reinstall fan guard. For proper performance with the value sound fan option, fan web should be 0.32 in. (8 mm) below top of orifice on the fan deck to top of the fan hub. (See Fig. 31.) Tighten set screws to 15 ± 1 ft-lb (20 ± 1.3 N-m).

> IMPORTANT: Check for proper fan rotation (clockwise when viewed from above). If necessary, switch any 2 power leads to reverse fan rotation.
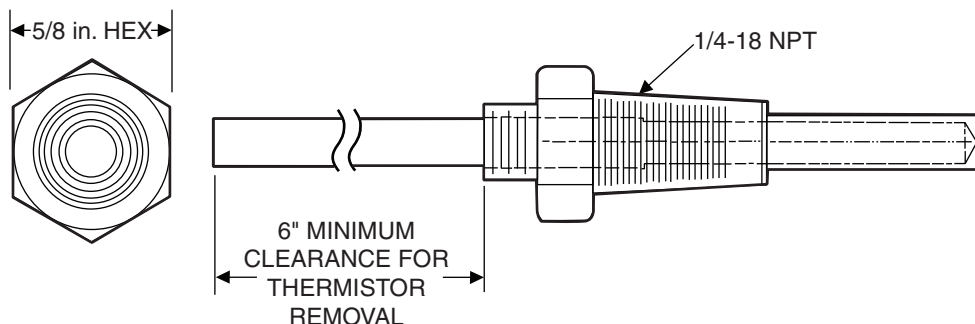
Fig. 28 — Thermistor Well

Table 33 — 5K Thermistor Temperatures (°F) vs. Resistance/Voltage Drop
(Voltage Drop for EWT, LWT, RGT, and OAT)

TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
−25	3.699	98,010	59	1.982	7,686	143	0.511	1,190
−24	3.689	94,707	60	1.956	7,665	144	0.502	1,165
−23	3.679	91,522	61	1.930	7,468	145	0.494	1,141
−22	3.668	88,449	62	1.905	7,277	146	0.485	1,118
−21	3.658	85,486	63	1.879	7,091	147	0.477	1,095
−20	3.647	82,627	64	1.854	6,911	148	0.469	1,072
−19	3.636	79,871	65	1.829	6,735	149	0.461	1,050
−18	3.624	77,212	66	1.804	6,564	150	0.453	1,029
−17	3.613	74,648	67	1.779	6,399	151	0.445	1,007
−16	3.601	72,175	68	1.754	6,238	152	0.438	986
−15	3.588	69,790	69	1.729	6,081	153	0.430	965
−14	3.576	67,490	70	1.705	5,929	154	0.423	945
−13	3.563	65,272	71	1.681	5,781	155	0.416	925
−12	3.550	63,133	72	1.656	5,637	156	0.408	906
−11	3.536	61,070	73	1.632	5,497	157	0.402	887
−10	3.523	59,081	74	1.609	5,361	158	0.395	868
−9	3.509	57,162	75	1.585	5,229	159	0.388	850
−8	3.494	55,311	76	1.562	5,101	160	0.381	832
−7	3.480	53,526	77	1.538	4,976	161	0.375	815
−6	3.465	51,804	78	1.516	4,855	162	0.369	798
−5	3.450	50,143	79	1.493	4,737	163	0.362	782
−4	3.434	48,541	80	1.470	4,622	164	0.356	765
−3	3.418	46,996	81	1.448	4,511	165	0.350	750
−2	3.402	45,505	82	1.426	4,403	166	0.344	734
−1	3.386	44,066	83	1.404	4,298	167	0.339	719
0	3.369	42,679	84	1.382	4,196	168	0.333	705
1	3.352	41,339	85	1.361	4,096	169	0.327	690
2	3.335	40,047	86	1.340	4,000	170	0.322	677
3	3.317	38,800	87	1.319	3,906	171	0.317	663
4	3.299	37,596	88	1.298	3,814	172	0.311	650
5	3.281	36,435	89	1.278	3,726	173	0.306	638
6	3.262	35,313	90	1.257	3,640	174	0.301	626
7	3.243	34,231	91	1.237	3,556	175	0.296	614
8	3.224	33,185	92	1.217	3,474	176	0.291	602
9	3.205	32,176	93	1.198	3,395	177	0.286	591
10	3.185	31,202	94	1.179	3,318	178	0.282	581
11	3.165	30,260	95	1.160	3,243	179	0.277	570
12	3.145	29,351	96	1.141	3,170	180	0.272	561
13	3.124	28,473	97	1.122	3,099	181	0.268	551
14	3.103	27,624	98	1.104	3,031	182	0.264	542
15	3.082	26,804	99	1.086	2,964	183	0.259	533
16	3.060	26,011	100	1.068	2,898	184	0.255	524
17	3.038	25,245	101	1.051	2,835	185	0.251	516
18	3.016	24,505	102	1.033	2,773	186	0.247	508
19	2.994	23,789	103	1.016	2,713	187	0.243	501
20	2.972	23,096	104	0.999	2,655	188	0.239	494
21	2.949	22,427	105	0.983	2,597	189	0.235	487
22	2.926	21,779	106	0.966	2,542	190	0.231	480
23	2.903	21,153	107	0.950	2,488	191	0.228	473
24	2.879	20,547	108	0.934	2,436	192	0.224	467
25	2.856	19,960	109	0.918	2,385	193	0.220	461
26	2.832	19,393	110	0.903	2,335	194	0.217	456
27	2.808	18,843	111	0.888	2,286	195	0.213	450
28	2.784	18,311	112	0.873	2,239	196	0.210	445
29	2.759	17,796	113	0.858	2,192	197	0.206	439
30	2.735	17,297	114	0.843	2,147	198	0.203	434
31	2.710	16,814	115	0.829	2,103	199	0.200	429
32	2.685	16,346	116	0.815	2,060	200	0.197	424
33	2.660	15,892	117	0.801	2,018	201	0.194	419
34	2.634	15,453	118	0.787	1,977	202	0.191	415
35	2.609	15,027	119	0.774	1,937	203	0.188	410
36	2.583	14,614	120	0.761	1,898	204	0.185	405
37	2.558	14,214	121	0.748	1,860	205	0.182	401
38	2.532	13,826	122	0.735	1,822	206	0.179	396
39	2.506	13,449	123	0.723	1,786	207	0.176	391
40	2.480	13,084	124	0.710	1,750	208	0.173	386
41	2.454	12,730	125	0.698	1,715	209	0.171	382
42	2.428	12,387	126	0.686	1,680	210	0.168	377
43	2.402	12,053	127	0.674	1,647	211	0.165	372
44	2.376	11,730	128	0.663	1,614	212	0.163	367
45	2.349	11,416	129	0.651	1,582	213	0.160	361
46	2.323	11,112	130	0.640	1,550	214	0.158	356
47	2.296	10,816	131	0.629	1,519	215	0.155	350
48	2.270	10,529	132	0.618	1,489	216	0.153	344
49	2.244	10,250	133	0.608	1,459	217	0.151	338
50	2.217	9,979	134	0.597	1,430	218	0.148	332
51	2.191	9,717	135	0.587	1,401	219	0.146	325
52	2.165	9,461	136	0.577	1,373	220	0.144	318
53	2.138	9,213	137	0.567	1,345	221	0.142	311
54	2.112	8,973	138	0.557	1,318	222	0.140	304
55	2.086	8,739	139	0.548	1,291	223	0.138	297
56	2.060	8,511	140	0.538	1,265	224	0.135	289
57	2.034	8,291	141	0.529	1,240	225	0.133	282
58	2.008	8,076	142	0.520	1,214			

Table 34 — 5K Thermistor Temperatures (°C) vs. Resistance/Voltage Drop
(Voltage Drop for EWT, LWT, RGT, and OAT)

TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
−32	3.705	100,260	15	1.982	7,855	62	0.506	1,158
−31	3.687	94,165	16	1.935	7,499	63	0.490	1,118
−30	3.668	88,480	17	1.889	7,161	64	0.475	1,079
−29	3.649	83,170	18	1.844	6,840	65	0.461	1,041
−28	3.629	78,125	19	1.799	6,536	66	0.447	1,006
−27	3.608	73,580	20	1.754	6,246	67	0.433	971
−26	3.586	69,250	21	1.710	5,971	68	0.420	938
−25	3.563	65,205	22	1.666	5,710	69	0.407	906
−24	3.539	61,420	23	1.623	5,461	70	0.395	876
−23	3.514	57,875	24	1.580	5,225	71	0.383	836
−22	3.489	54,555	25	1.538	5,000	72	0.371	805
−21	3.462	51,450	26	1.497	4,786	73	0.360	775
−20	3.434	48,536	27	1.457	4,583	74	0.349	747
−19	3.406	45,807	28	1.417	4,389	75	0.339	719
−18	3.376	43,247	29	1.378	4,204	76	0.329	693
−17	3.345	40,845	30	1.340	4,028	77	0.319	669
−16	3.313	38,592	31	1.302	3,861	78	0.309	645
−15	3.281	38,476	32	1.265	3,701	79	0.300	623
−14	3.247	34,489	33	1.229	3,549	80	0.291	602
−13	3.212	32,621	34	1.194	3,404	81	0.283	583
−12	3.177	30,866	35	1.160	3,266	82	0.274	564
−11	3.140	29,216	36	1.126	3,134	83	0.266	547
−10	3.103	27,633	37	1.093	3,008	84	0.258	531
−9	3.065	26,202	38	1.061	2,888	85	0.251	516
−8	3.025	24,827	39	1.030	2,773	86	0.244	502
−7	2.985	23,532	40	0.999	2,663	87	0.237	489
−6	2.945	22,313	41	0.969	2,559	88	0.230	477
−5	2.903	21,163	42	0.940	2,459	89	0.223	466
−4	2.860	20,079	43	0.912	2,363	90	0.217	456
−3	2.817	19,058	44	0.885	2,272	91	0.211	446
−2	2.774	18,094	45	0.858	2,184	92	0.204	436
−1	2.730	17,184	46	0.832	2,101	93	0.199	427
0	2.685	16,325	47	0.807	2,021	94	0.193	419
1	2.639	15,515	48	0.782	1,944	95	0.188	410
2	2.593	14,749	49	0.758	1,871	96	0.182	402
3	2.547	14,026	50	0.735	1,801	97	0.177	393
4	2.500	13,342	51	0.713	1,734	98	0.172	385
5	2.454	12,696	52	0.691	1,670	99	0.168	376
6	2.407	12,085	53	0.669	1,609	100	0.163	367
7	2.360	11,506	54	0.649	1,550	101	0.158	357
8	2.312	10,959	55	0.629	1,493	102	0.154	346
9	2.265	10,441	56	0.610	1,439	103	0.150	335
10	2.217	9,949	57	0.591	1,387	104	0.146	324
11	2.170	9,485	58	0.573	1,337	105	0.142	312
12	2.123	9,044	59	0.555	1,290	106	0.138	299
13	2.076	8,627	60	0.538	1,244	107	0.134	285
14	2.029	8,231	61	0.522	1,200			

Table 35 — 10K Thermistor Temperature (°F) vs. Resistance/Voltage Drop (For SPT)

TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
−25	4.758	196,453	61	2.994	14,925	147	0.890	2,166
−24	4.750	189,692	62	2.963	14,549	148	0.876	2,124
−23	4.741	183,300	63	2.932	14,180	149	0.862	2,083
−22	4.733	177,000	64	2.901	13,824	150	0.848	2,043
−21	4.724	171,079	65	2.870	13,478	151	0.835	2,003
−20	4.715	165,238	66	2.839	13,139	152	0.821	1,966
−19	4.705	159,717	67	2.808	12,814	153	0.808	1,928
−18	4.696	154,344	68	2.777	12,493	154	0.795	1,891
−17	4.686	149,194	69	2.746	12,187	155	0.782	1,855
−16	4.676	144,250	70	2.715	11,884	156	0.770	1,820
−15	4.665	139,443	71	2.684	11,593	157	0.758	1,786
−14	4.655	134,891	72	2.653	11,308	158	0.745	1,752
−13	4.644	130,402	73	2.622	11,031	159	0.733	1,719
−12	4.633	126,183	74	2.592	10,764	160	0.722	1,687
−11	4.621	122,018	75	2.561	10,501	161	0.710	1,656
−10	4.609	118,076	76	2.530	10,249	162	0.699	1,625
−9	4.597	114,236	77	2.500	10,000	163	0.687	1,594
−8	4.585	110,549	78	2.470	9,762	164	0.676	1,565
−7	4.572	107,006	79	2.439	9,526	165	0.666	1,536
−6	4.560	103,558	80	2.409	9,300	166	0.655	1,508
−5	4.546	100,287	81	2.379	9,078	167	0.645	1,480
−4	4.533	97,060	82	2.349	8,862	168	0.634	1,453
−3	4.519	94,020	83	2.319	8,653	169	0.624	1,426
−2	4.505	91,019	84	2.290	8,448	170	0.614	1,400
−1	4.490	88,171	85	2.260	8,251	171	0.604	1,375
0	4.476	85,396	86	2.231	8,056	172	0.595	1,350
1	4.461	82,729	87	2.202	7,869	173	0.585	1,326
2	4.445	80,162	88	2.173	7,685	174	0.576	1,302
3	4.429	77,662	89	2.144	7,507	175	0.567	1,278
4	4.413	75,286	90	2.115	7,333	176	0.558	1,255
5	4.397	72,940	91	2.087	7,165	177	0.549	1,233
6	4.380	70,727	92	2.059	6,999	178	0.540	1,211
7	4.363	68,542	93	2.030	6,838	179	0.532	1,190
8	4.346	66,465	94	2.003	6,683	180	0.523	1,169
9	4.328	64,439	95	1.975	6,530	181	0.515	1,148
10	4.310	62,491	96	1.948	6,383	182	0.507	1,128
11	4.292	60,612	97	1.921	6,238	183	0.499	1,108
12	4.273	58,781	98	1.894	6,098	184	0.491	1,089
13	4.254	57,039	99	1.867	5,961	185	0.483	1,070
14	4.235	55,319	100	1.841	5,827	186	0.476	1,052
15	4.215	53,693	101	1.815	5,698	187	0.468	1,033
16	4.195	52,086	102	1.789	5,571	188	0.461	1,016
17	4.174	50,557	103	1.763	5,449	189	0.454	998
18	4.153	49,065	104	1.738	5,327	190	0.447	981
19	4.132	47,627	105	1.713	5,210	191	0.440	964
20	4.111	46,240	106	1.688	5,095	192	0.433	947
21	4.089	44,888	107	1.663	4,984	193	0.426	931
22	4.067	43,598	108	1.639	4,876	194	0.419	915
23	4.044	42,324	109	1.615	4,769	195	0.413	900
24	4.021	41,118	110	1.591	4,666	196	0.407	885
25	3.998	39,926	111	1.567	4,564	197	0.400	870
26	3.975	38,790	112	1.544	4,467	198	0.394	855
27	3.951	37,681	113	1.521	4,370	199	0.388	841
28	3.927	36,610	114	1.498	4,277	200	0.382	827
29	3.903	35,577	115	1.475	4,185	201	0.376	814
30	3.878	34,569	116	1.453	4,096	202	0.370	800
31	3.853	33,606	117	1.431	4,008	203	0.365	787
32	3.828	32,654	118	1.409	3,923	204	0.359	774
33	3.802	31,752	119	1.387	3,840	205	0.354	762
34	3.776	30,860	120	1.366	3,759	206	0.349	749
35	3.750	30,009	121	1.345	3,681	207	0.343	737
36	3.723	29,177	122	1.324	3,603	208	0.338	725
37	3.697	28,373	123	1.304	3,529	209	0.333	714
38	3.670	27,597	124	1.284	3,455	210	0.328	702
39	3.654	26,838	125	1.264	3,383	211	0.323	691
40	3.615	26,113	126	1.244	3,313	212	0.318	680
41	3.587	25,396	127	1.225	3,244	213	0.314	670
42	3.559	24,715	128	1.206	3,178	214	0.309	659
43	3.531	24,042	129	1.187	3,112	215	0.305	649
44	3.503	23,399	130	1.168	3,049	216	0.300	639
45	3.474	22,770	131	1.150	2,986	217	0.296	629
46	3.445	22,161	132	1.132	2,926	218	0.292	620
47	3.416	21,573	133	1.114	2,866	219	0.288	610
48	3.387	20,998	134	1.096	2,809	220	0.284	601
49	3.357	20,447	135	1.079	2,752	221	0.279	592
50	3.328	19,903	136	1.062	2,697	222	0.275	583
51	3.298	19,386	137	1.045	2,643	223	0.272	574
52	3.268	18,874	138	1.028	2,590	224	0.268	566
53	3.238	18,384	139	1.012	2,539	225	0.264	557
54	3.208	17,904	140	0.996	2,488			
55	3.178	17,441	141	0.980	2,439			
56	3.147	16,991	142	0.965	2,391			
57	3.117	16,552	143	0.949	2,343			
58	3.086	16,131	144	0.934	2,297			
59	3.056	15,714	145	0.919	2,253			
60	3.025	15,317	146	0.905	2,209			

Table 36 — 10K Thermistor Temperature (°C) vs. Resistance/Voltage Drop (For SPT)

TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
−32	4.762	200,510	15	3.056	15,714	62	0.940	2,315
−31	4.748	188,340	16	3.000	15,000	63	0.913	2,235
−30	4.733	177,000	17	2.944	14,323	64	0.887	2,157
−29	4.716	166,342	18	2.889	13,681	65	0.862	2,083
−28	4.700	156,404	19	2.833	13,071	66	0.837	2,011
−27	4.682	147,134	20	2.777	12,493	67	0.813	1,943
−26	4.663	138,482	21	2.721	11,942	68	0.790	1,876
−25	4.644	130,402	22	2.666	11,418	69	0.767	1,813
−24	4.624	122,807	23	2.610	10,921	70	0.745	1,752
−23	4.602	115,710	24	2.555	10,449	71	0.724	1,693
−22	4.580	109,075	25	2.500	10,000	72	0.703	1,637
−21	4.557	102,868	26	2.445	9,571	73	0.683	1,582
−20	4.533	97,060	27	2.391	9,164	74	0.663	1,530
−19	4.508	91,588	28	2.337	8,776	75	0.645	1,480
−18	4.482	86,463	29	2.284	8,407	76	0.626	1,431
−17	4.455	81,662	30	2.231	8,056	77	0.608	1,385
−16	4.426	77,162	31	2.178	7,720	78	0.591	1,340
−15	4.397	72,940	32	2.127	7,401	79	0.574	1,297
−14	4.367	68,957	33	2.075	7,096	80	0.558	1,255
−13	4.335	65,219	34	2.025	6,806	81	0.542	1,215
−12	4.303	61,711	35	1.975	6,530	82	0.527	1,177
−11	4.269	58,415	36	1.926	6,266	83	0.512	1,140
−10	4.235	55,319	37	1.878	6,014	84	0.497	1,104
−9	4.199	52,392	38	1.830	5,774	85	0.483	1,070
−8	4.162	49,640	39	1.784	5,546	86	0.470	1,037
−7	4.124	47,052	40	1.738	5,327	87	0.457	1,005
−6	4.085	44,617	41	1.692	5,117	88	0.444	974
−5	4.044	42,324	42	1.648	4,918	89	0.431	944
−4	4.003	40,153	43	1.605	4,727	90	0.419	915
−3	3.961	38,109	44	1.562	4,544	91	0.408	889
−2	3.917	36,182	45	1.521	4,370	92	0.396	861
−1	3.873	34,367	46	1.480	4,203	93	0.386	836
0	3.828	32,654	47	1.439	4,042	94	0.375	811
1	3.781	31,030	48	1.400	3,889	95	0.365	787
2	3.734	29,498	49	1.362	3,743	96	0.355	764
3	3.686	28,052	50	1.324	3,603	97	0.345	742
4	3.637	26,686	51	1.288	3,469	98	0.336	721
5	3.587	25,396	52	1.252	3,340	99	0.327	700
6	3.537	24,171	53	1.217	3,217	100	0.318	680
7	3.485	23,013	54	1.183	3,099	101	0.310	661
8	3.433	21,918	55	1.150	2,986	102	0.302	643
9	3.381	20,883	56	1.117	2,878	103	0.294	626
10	3.328	19,903	57	1.086	2,774	104	0.287	609
11	3.274	18,972	58	1.055	2,675	105	0.279	592
12	3.220	18,090	59	1.025	2,579	106	0.272	576
13	3.165	17,255	60	0.996	2,488	107	0.265	561
14	3.111	16,464	61	0.968	2,400			

Table 37 — 86K Thermistor vs Resistance (DTT)

TEMP (C)	TEMP (F)	RESISTANCE (Ohms)	TEMP (C)	TEMP (F)	RESISTANCE (Ohms)
-40	-40	2,889,600	75	167	12,730
-35	-31	2,087,220	80	176	10,790
-30	-22	1,522,200	85	185	9,200
-25	-13	1,121,440	90	194	7,870
-20	-4	834,720	95	203	6,770
-15	5	627,280	100	212	5,850
-10	14	475,740	105	221	5,090
-5	23	363,990	110	230	4,450
0	32	280,820	115	239	3,870
5	41	218,410	120	248	3,350
10	50	171,170	125	257	2,920
15	59	135,140	130	266	2,580
20	68	107,440	135	275	2,280
25	77	86,000	140	284	2,020
30	86	69,280	145	293	1,800
35	95	56,160	150	302	1,590
40	104	45,810	155	311	1,390
45	113	37,580	160	320	1,250
50	122	30,990	165	329	1,120
55	131	25,680	170	338	1,010
60	140	21,400	175	347	920
70	158	15,070	180	356	830
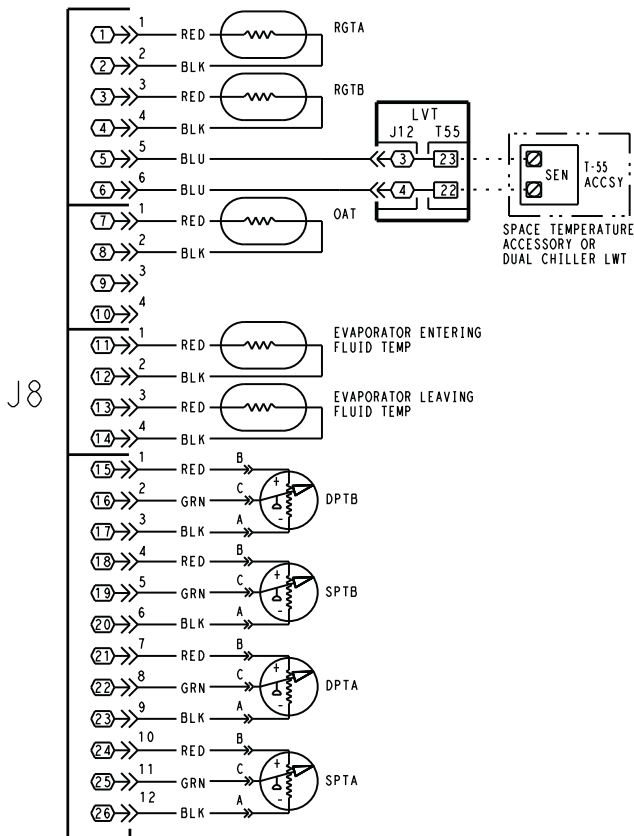
LEGEND

ACCSY	—	Accessory
DPT	—	Discharge Pressure Transducer
LWT	—	Leaving Water Temperature Sensor
LVT	—	Low Voltage Terminal
OAT	—	Outdoor Air Temperature Sensor
RGT	—	Return Gas Temperature Sensor
SEN	—	Sensor Terminal Block
SPT	—	Space Temperature Sensor

**Fig. 29 — Thermistor Connections to
Main Base Board, J8 Connector**
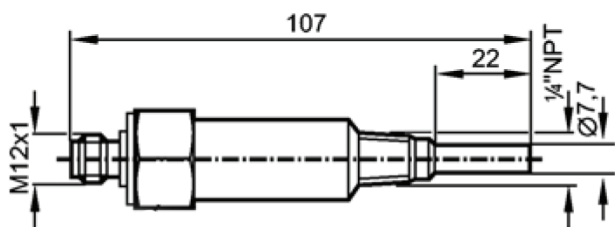
Fig. 30 — Chilled Water Flow Switch
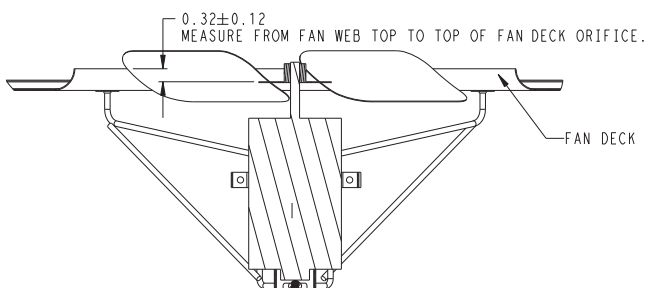
Fig. 31 — Mounted Fan Position

LOW SOUND FAN — A shroud and a wire guard provide protection from the rotating fan. The exposed end of the fan motor shaft is protected from weather by grease. If fan motor must be removed for service or replacement, be sure to re-grease fan shaft and reinstall fan guard. The fan motor has a step in the motor shaft. For proper performance, fan should be positioned such that it is securely seated on this step. Tighten the bolt to 15 ± 1 ft-lb (20 ± 1.3 N·m).

> IMPORTANT: Check for proper fan rotation (counter-clockwise when viewed from above). If necessary, switch any 2 power leads to reverse fan rotation.

Motormaster® V Controller — The Motormaster V controller is standard on size 010 and 015 units. For other sizes, the optional or accessory Motormaster V controller uses an input signal from the AUX board. See Fig. 32. The controller is factory configured and requires no field programming. If a situation arises where the drive does not function properly, the information provided below and in Table 38 can be used to troubleshoot the drive.

> ⚠ **WARNING**
>
> Hazard of electrical shock. Wait three minutes after disconnecting incoming power before servicing drive. Capacitors retain charge after power is removed. Drive assembly includes externally mounted current limiting resistors. Use extreme caution when servicing the drive. Failure to comply could result in possible personal injury.

> ⚠ **WARNING**
>
> When configured as shown in this literature, this equipment is designed to start when it receives line power. Ensure that all personnel are clear of fans and guards are installed before applying power. Failure to comply could result in possible personal injury.

> ⚠ **CAUTION**
>
> DO NOT connect incoming AC power to output terminals T1, T2, and T3. Severe damage to the drive will result. Do not continuously cycle input power to the drive more than once every two minutes. Damage to the drive will result.

> ⚠ **CAUTION**
>
> If input power has not been applied to the drive for a period of time exceeding three years (due to storage, etc.), the electrolytic DC bus capacitors within the drive can change internally, resulting in excessive leakage current. This can result in premature failure of the capacitors if the drive is operated after such a long period of inactivity or storage. In order to reform the capacitors and prepare the drive for operation after a long period of inactivity, apply input power to the drive for 8 hours prior to actually operating the motor. Before attempting to operate the drive, motor, and driven equipment, be sure all procedures pertaining to installation and wiring have been properly followed. Failure to comply could result in equipment damage.

GENERAL OPERATION — The speed varies in proportion to a 4 to 20 mA signal produced by the *Comfort*Link™ controls. The MMV output speed is displayed in Hz.

The *Comfort*Link controls must be configured for MMV operation in order for it to operate. This is configured under the Configuration menu (***Configuration→MM→MMR.S***) and

selecting "YES". This configuration menu also contains the gains and minimum speed for the Motormaster control logic.

CONFIGURATION — The MMV is configured for 1 of 12 operation modes based on the inputs to the control terminal block. The 30RAP units use operating modes 5-8. In these configurations, the MMV follows a 4 to 20 mA speed reference signal present on terminals 25 (+) and 2 (-). One additional jumper is required to configure the drive for 50/60 Hz operation and input voltage. See Table 39 for proper inputs. Once the drive is powered, it will change to the mode selected according to the inputs. See Fig. 33.

DRIVE PROGRAMMING

⚠ CAUTION

It is strongly recommended that the user NOT change any programming without consulting Carrier service personnel. Unit damage may occur from improper programming.

To enter password and change program values:

1. Press **Mode.**
2. Upper right decimal point blinks.
3. Display reads "00". To enter the PROGRAM mode to access the parameters, press the **Mode** button. This will activate the PASSWORD prompt (if the password has not been disabled). The display will read "00" and the upper right-hand decimal point will be blinking. (See Fig. 33.)
4. Use the ▲ and ▼ buttons to scroll to the password value (the factory default password is "1111") and press the **Mode** button. Once the correct password value is entered, the display will read "P01", which indicates that the PROGRAM mode has been accessed at the beginning of the parameter menu (P01 is the first parameter).

NOTE: If the display flashes "Er", the password was incorrect, and the process to enter the password must be repeated.

5. Press **Mode** to display present parameter number. Upper right decimal point blinks.

   Use the ▲ and ▼ buttons to scroll to the desired parameter number.

Once the desired parameter number is found, press the **Mode** button to display the present parameter setting. The upper right-hand decimal point will begin blinking, indicating that the present parameter setting is being displayed, and that it can be changed by using the up and down buttons. Use ▲ and ▼ to change setting. Press **Mode** to store new setting.

Pressing the **Mode** will store the new setting and also exit the PROGRAM mode. To change another parameter, press the **Mode** key again to re-enter the PROGRAM mode (the parameter menu will be accessed at the parameter that was last viewed or changed before exiting). If the **Mode** key is pressed within two minutes of exiting the PROGRAM mode, the password is not required to access the parameters. After two minutes, the password must be entered in order to access the parameters again.

To change password: first enter the current password then change parameter P44 to the desired password.

To disable automatic control mode and enter manual speed control mode:

1. Change P05 to '01- keypad'.
2. Push UP and DOWN arrow key to set manual speed.
3. Set P05 to '04 - 4-20mA control' to restore 4 to 20 mA control.

EPM CHIP — The drive uses a electronic programming module (EPM) chip to store the program parameters. This is an EEPROM memory chip and is accessible from the front of the

VFD. It should not be removed with power applied to the VFD.

LOSS OF CCN COMMUNICATIONS — Carrier Comfort Network® (CCN) communications with external control systems can be affected by high frequency electrical noise generated by the Motormaster V control. Ensure unit is well grounded to eliminate ground currents along communication lines.

If communications are lost only while Motormaster V control is in operation, order a signal isolator (CEAS420876-2) and power supplies (CEAS221045-01, 2 required) for the CCN communication line.

Fault Codes — The drive is programmed to automatically restart after a fault and will attempt to restart three times after a fault (the drive will not restart after CF, cF, GF, F1, F2-F9, or Fo faults). If all three restart attempts are unsuccessful, the drive will trip into FAULT LOCKOUT (LC), which requires a manual reset.

Manual Reset — If fault condition has been removed, cycle power to the chiller to reset the VFD.

Troubleshooting — Troubleshooting the Motormaster® V control requires a combination of observing system operation and VFD information. The drive provides 2 kinds of troubleshooting modes: a status matrix using the 3-digit display (P57, P58) and real time monitoring of key inputs and outputs. The collective group is displayed through parameters 50-60 and all values are read-only.

- **P50: FAULT HISTORY —** Last 8 faults
- **P51: SOFTWARE version**
- **P52: DC BUS VOLTAGE —** in percent of nominal. Usually rated input voltage x 1.4
- **P53: MOTOR VOLAGE —** in percent of rated output voltage
- **P54: LOAD —** in percent of drives rated output current rating
- **P55: VDC INPUT —** in percent of maximum input: 100 will indicate full scale which is 5 v
- **P56: 4-20 mA INPUT —** in percent of maximum input. 20% = 4 mA, 100% = 20 mA

Manual Starter Trip — If the VFD manual starter (MS-FC-HS, MS-FC-A1 or MS-FC-B1 depending on model) trips, locate the inrush current protectors (3 round black disks per motor) and verify their resistance. For units operating at 208 v or 230 v, these devices should measure approximately 7 ohms. For all other voltages, they should measure approximately 20 ohms. Check value with mating plug disconnected, power to chiller off and at ambient temperature (not hot immediately after stopping VFD). These are standard resistances at 77 F (25 C). Resistance values decrease at higher temperatures and increase at lower temperatures.

REPLACING DEFECTIVE MODULES — The *Comfort-Link™* replacement modules are shown in Table 40. If the main base board (MBB) has been replaced, verify that all configuration data is correct. Follow the *Configuration* mode table and verify that all items under sub-modes *UNIT*, *OPT1* and *OPT2* are correct. Any additional field-installed accessories or options (*RSET*, *SLCT* sub-modes) should also be verified as well as any specific time and maintenance schedules.

Refer to the Start-Up Checklist for 30RAP Liquid Chillers (completed at time of original start-up) found in the job folder. This information is needed later in this procedure. If the checklist does not exist, fill out the current information in the Configuration mode on a new checklist. Tailor the various options and configurations as needed for this particular installation.

Fig. 32 — Typical Motormaster Wiring
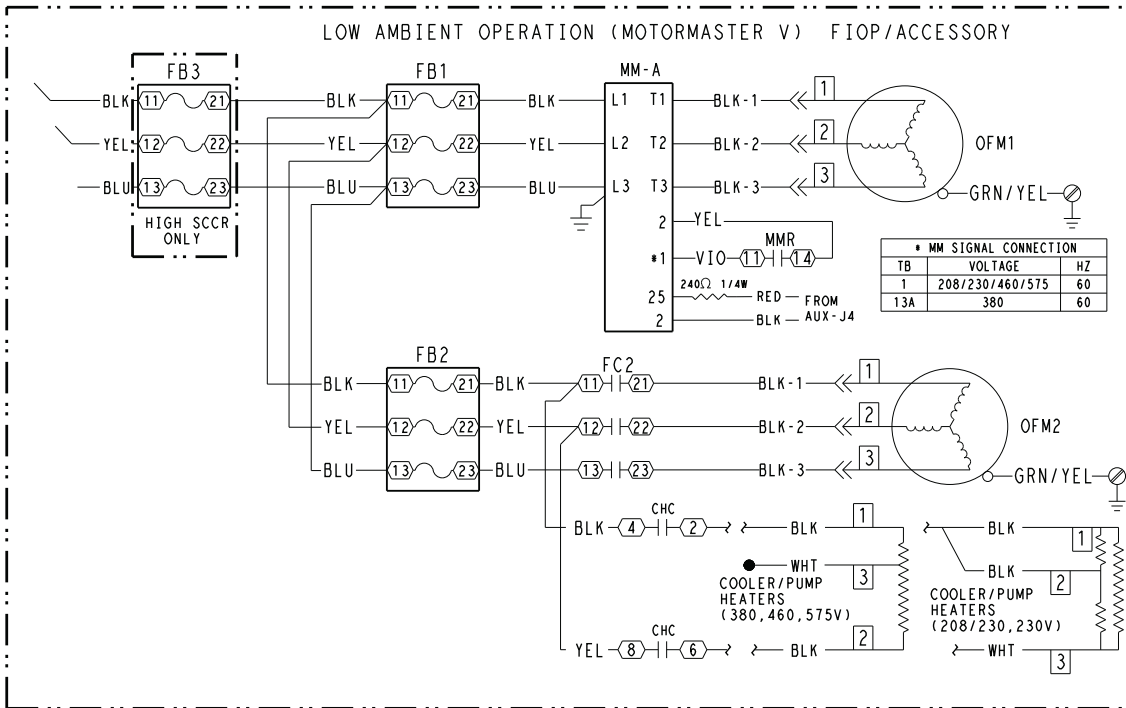
LEGEND

AUX — Auxiliary
FB — Fuse Block
MM — Motormaster
OFM — Outdoor Fan Motor
TB — Terminal Block

CONFIGURATION TABLE

MODE	NOMINAL VOLTAGE	Hz	CONTROL INPUT (PINS 25, 2)	START JUMPER
5	208/230/460/575*	60	External control 4-20 mA	TB1-TB2
6	208/380	60	External control 4-20 mA	TB13A-TB2

*208-v can run in mode 5 or 6.

Fig. 33 — Motormaster® V Mode Buttons and Mode Display
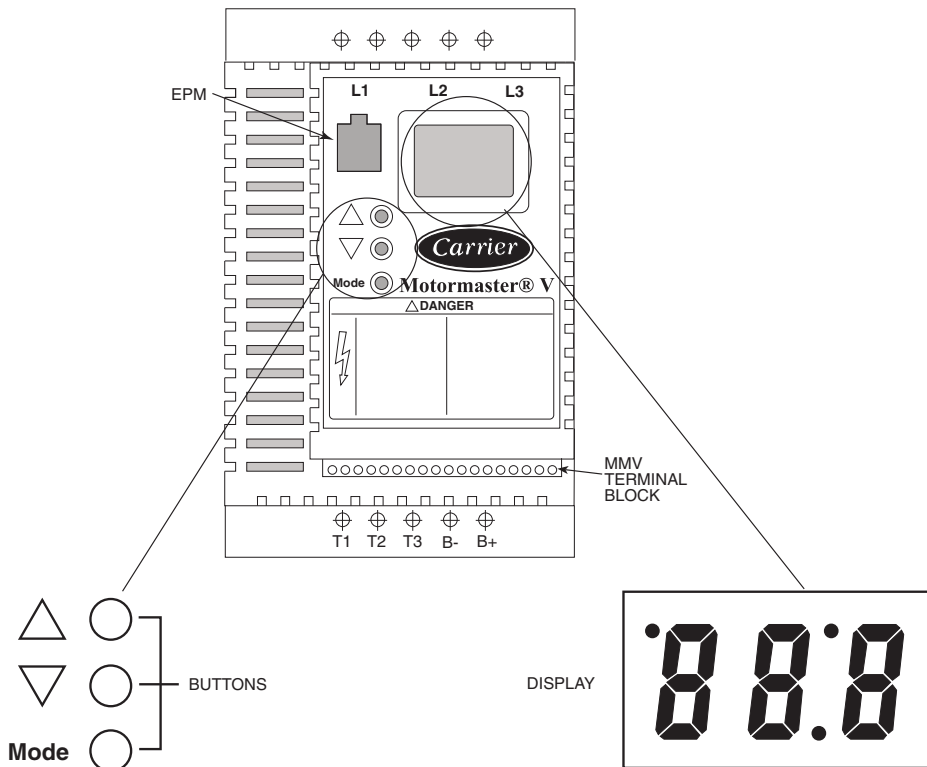
Table 38 — Fault Codes

FAULT CODE	DESCRIPTION	SOLUTION
AF	High Temperature Fault: Ambient temperature is too high; Cooling fan has failed (if equipped).	Check cooling fan operation
CF	Control Fault: A blank EPM, or an EPM with corrupted data has been installed.	Perform a factory reset using Parameter 48 — PROGRAM SELECTION.
cF	Incompatibility Fault: An EPM with an incompatible parameter version has been installed.	Either remove the EPM or perform a factory reset (Parameter 48) to change the parameter version of the EPM to match the parameter version of the drive.
CL	CURRENT LIMIT: The output current has exceeded the CURRENT LIMIT setting (Parameter 25) and the drive is reducing the output frequency to reduce the output current. If the drive remains in CURRENT LIMIT too long, it can trip into a CURRENT OVERLOAD fault (PF).	Check for loose electrical connections. Check for faulty condenser fan motor. Check Parameter P25 from Table 39 is set correctly.
GF	Data Fault: User data and OEM defaults in the EPM are corrupted.	Restore factory defaults P48, see section above. If that does not work, replace EPM.
HF	High DC Bus Voltage Fault: Line voltage is too high; Deceleration rate is too fast; Overhauling load.	Check line voltage — set P01 appropriately
JF	Serial Fault: The watchdog timer has timed out, indicating that the serial link has been lost.	Check serial connection (computer) Check settings for PXX. Check settings in communication software to match PXX.
LF	Low DC Bus Voltage Fault: Line voltage is too low.	Check line voltage — set P01 appropriately
OF	Output Transistor Fault: Phase to phase or phase to ground short circuit on the output; Failed output transistor; Boost settings are too high; Acceleration rate is too fast.	Reduce boost or increase acceleration values. If unsuccessful, replace drive.
PF	Current Overload Fault: VFD is undersized for the application; Mechanical problem with the driven equipment.	Check line voltage — set P01 appropriately Check for dirty coils Check for motor bearing failure
SF	Single-phase Fault: Single-phase input power has been applied to a three-phase drive.	Check input power phasing
F1	EPM Fault: The EPM is missing or damaged.	
F2-F9, Fo	Internal Faults: The control board has sensed a problem	Consult factory
Drive display = 60.0 even though it is cold outside and it should be running slower	Feedback signal is above set point	Check for proper set point Check liquid line pressure
Drive display = '---' even though drive should be running	Start jumper is missing	Replace start jumper. See section above
Drive display = 8.0 even though fan should be running faster	Feedback signal is below set point and fan is at minimum speed	Check for proper set point Check liquid line pressure
VFD flashes 57 and LCS	Feedback or speed signal lost. Drive will operate at 57 Hz until reset or loss of start command. Resetting requires cycling start command (or power).	In stand alone mode: Check transducer wiring and feedback voltage. Feedback voltage displayed on P-69. Pin 6 should be 5 v output. Pin 5 (feedback) should be somewhere between 0 and 5 v.

LEGEND

EPM — Electronic Programming Module
LCS — Lost Control Signal
OEM — Outside Equipment Manufacturer
VFD — Variable Frequency Drive

Table 39 — Motormaster® V Program Parameters for Operating Modes

PARAMETERS	DESCRIPTION	MODE 5	MODE 6	MODE 7	MODE 8
P01	Line Voltage: 01 = low line, 02 = high line	01	02	01	02
P02	Carrier Freq: 01 = 4 kHz, 02 = 6 kHz, 03 = 8 kHz	01	01	01	01
P03	Startup mode: flying restart	06	06	06	06
P04	Stop mode: coast to stop	01	01	01	01
P05	Standard Speed source: 01= keypad, 04=4-20mA (NO PI), 05= R22, 06=R134a	04	04	04	04
P06	TB-14 output: 01 = none	01	01	01	01
P08	TB-30 output: 01 = none	01	01	01	01
P09	TB-31 Output: 01 = none	01	01	01	01
P10	TB-13A function sel: 01 = none	01	01	01	01
P11	TB-13B function sel: 01 = none	01	01	01	01
P12	TB-13C function sel: 01 = none	01	01	01	01
P13	TB-15 output: 01 = none	01	01	01	01
P14	Control: 01 = Terminal strip	01	01	01	01
P15	Serial link: 02 = enabled 9600,8,N,2 with timer	02	02	02	02
P16	Units editing: 02 = whole units	02	02	02	02
P17	Rotation: 01 = forward only, 03 = reverse only	01	01	01	01
P19	Acceleration time: 10 sec	10	10	10	10
P20	Deceleration time: 10 sec	10	10	10	10
P21	DC brake time: 0	0	0	0	0
P22	DC BRAKE VOLTAGE 0%	0	0	0	0
P23	Min freq = 8 Hz ~ 100 – 160 rpm	8	8	8	8
P24	Max freq	60	60	50	50
P25	Current limit: (%)	125	110	125	110
P26	Motor overload: 100	100	100	100	100
P27	Base freq: 60 or 50 Hz	60	60	50	50
P28	Fixed boost: 0.5% at low frequencies	0.5	0.5	0.5	0.5
P29	Accel boost: 0%	0	0	0	0
P30	Slip compensation: 0%	0	0	0	0
P31	Preset spd #1: speed if loss of control signal	57	57	47	47
P32	Preset spd #2: 0	0	0	0	0
P33	Preset spd #3: 0	0	0	0	0
P34	Preset spd 4 default — R22 set point. TB12-2 open	18.0	18.0	18.0	18.0
P35	Preset spd 5 default — R134a set point. TB12-2 closed	12.6	12.6	12.6	12.6
P36	Preset spd 6 default	0	0	0	0
P37	Preset spd 7 default	0	0	0	0
P38	Skip bandwidth	0	0	0	0
P39	Speed scaling	0	0	0	0
P40	Frequency scaling 50 or 60 Hz	60	60	50	50
P41	Load scaling: default (not used so NA)	200	200	200	200
P42	Accel/decel #2: default (not used so NA)	60	60	60	60
P43	Serial address	1	1	1	1
P44	Password:111	111	111	111	111
P45	Speed at min signal: 8 Hz; used when PID mode is disabled and 4-20mA input is at 4 mA	8	8	8	8
P46	Speed at max feedback: 60 or 50 Hz. Used when PID disabled and 4-20mA input is at 20 mA	60	60	50	50
P47	Clear history? 01 = maintain. (set to 02 to clear)	01	01	01	01
P48	Program selection: Program 1 – 12	05	06	07	08
P61	PI Mode: 05= reverse, 0-5V, 01 = no PID	01	01	01	01
P62	Min feedback = 0 (0V *10)	0	0	0	0
P63	Max feedback = 50 (5V * 10)	50	50	50	50
P64	Proportional gain = 4%	4	4	4	4
P65	Integral gain = .2	.2	.2	.2	.2
P66	PI acell/decel (set point change filter) = 5	5	5	5	5
P67	Min alarm	0	0	0	0
P68	Max alarm	0	0	0	0

LEGEND

NA — Not Applicable
PID — Proportional Integral Derivative
TB — Terminal Block

1. Check that all power to unit is off. Carefully disconnect all wires from the defective module by unplugging its connectors.

2. Remove the defective module by removing its mounting screws with a Phillips screwdriver, and removing the module from the control box. Save the screws later use.

3. Verify that the instance jumper (MBB) or address switches (all other modules) exactly match the settings of the defective module.

   NOTE: Handle boards by mounting standoffs only to avoid electrostatic discharge.

4. Package the defective module in the carton of the new module for return to Carrier.

5. Mount the new module in the unit's control box using a Phillips screwdriver and the screws saved in Step 2.

6. Reinstall all module connectors. For accessory Navigator replacement, make sure the plug is installed at TB3 in the LEN connector.

7. Carefully check all wiring connections before restoring power.

8. Verify the ENABLE/OFF/REMOTE CONTACT switch is in the OFF position.

9. Restore control power. Verify that all module red LEDs blink in unison. Verify that all green LEDs are blinking and that the scrolling marquee or Navigator™ display is communicating correctly.

10. Verify all configuration information, settings, set points and schedules. Return the ENABLE/OFF/REMOTE CONTACT switch to its previous position.

Table 40 — Replacement Modules

MODULE	REPLACEMENT PART NO. (with Software)	REPLACEMENT PART NO. (without Software)
Main Base Board (MBB)	30RA502134	HK50AA029
Scrolling Marquee Display	HK50AA031	HK50AA030
Energy Management Module (EMM)	30GT515218	HK50AA028
Navigator Display	HK50AA033	N/A
EXV	30GT515217	HK50AA026
AUX	32GB500442E	N/A

Hydronic Package — If the unit is equipped with a factory-installed hydronic package, consult the information below for proper maintenance and service. In addition to this information, each factory-installed hydronic package is supplied with a packet of information supplied by the manufacturer, Bell & Gossett. Carrier Corporation strongly recommends that this information be thoroughly reviewed prior to operation of the chiller.

PUMP PERFORMANCE CHECK — The factory-installed pumps in the 30RAP units are shipped with a single impeller size available for that pump. The pump was selected based on the flow and head requirements as provided to Carrier. It is not uncommon for actual pump duty to be different than what was anticipated at time of selection. In many cases, it may be desirable to make some field modifications to obtain optimum pump performance.

Before any pump modifications are made, it is recommended that actual pump performance be verified and compared to the applicable pump curve. See base unit installation instructions. This can be done in a variety of ways:

1. If pump impeller diameter is known:

   a. Connect a differential pressure gage across the pump at the ports provided on the pump volutes.

   b. Read GPM from applicable impeller curve.

2. If pump impeller diameter is not known:

   If pump impeller diameter has been trimmed and the size is not known, it is necessary to determine which impeller curve to read.

   The easiest way to confirm pump performance is to "dead-head" the pump and read the differential pressure across the pressure ports on the pump. "Dead-heading" can be done by shutting the circuit setter valve on the discharge side of the pump.

   NOTE: Although not all pumps can be safely "dead-headed", centrifugal pumps (such as on the 30RAP units) can be "dead-headed" for short amounts of time. It is recommended to keep the time short due to excessive heat build-up in the pump.

   Since the "dead-head" condition is a no-flow condition, the head will correspond to the intersection of an impeller curve with the vertical axis of the pump chart. The correct impeller diameter is that which corresponds to the measured head.

3. Once the impeller diameter is known, proceed as in Step 1.

4. Water flow rate can be determined by using a differential pressure gage with the Bell & Gossett circuit setter balance valve calculator. (This information is also provided in the installation instructions.) This method will not directly measure pressure differential seen by the pump, but can be used to "double-check" the pump measurement.

5. Verify that cable connections at the switch and at the terminal block are secure.

6. For factory-installed hydronic system, verify that:

   • All air has been purged from the system.
   • Circuit setter balance valve has been correctly set.

7. Pump impeller has been improperly trimmed and is not providing sufficient flow.

8. Wrong pump motor rotation. Pump must rotate clockwise when viewed from motor end of pump.

PUMP MODIFICATIONS AND IMPELLER TRIMMING — See applicable section in the Installation instructions.

RESET OF CHILLER WATER FLOW — See applicable section in the Installation instructions.

CHANGING OF PUMP SEALS — See Bell & Gossett service instruction manual provided with the hydronic package.

MAINTENANCE

Recommended Maintenance Schedule — The following are only recommended guidelines. Jobsite conditions may dictate that maintenance schedule is performed more often than recommended.

Routine:

For machines with e-coat condenser coils:
• Periodic clean water rinse, especially in coastal and industrial applications.

- Check condenser coils for debris, clean as necessary.

Every month:
- Check moisture indicating sight glass for possible refrigerant loss and presence of moisture.

Every 3 months (for all machines):
- Check refrigerant charge.
- Check all refrigerant joints and valves for refrigerant leaks, repair as necessary.
- Check chilled water flow switch operation.
- Check all condenser fans for proper operation.
- Check compressor oil level.

Every 12 months (for all machines):
- Check all electrical connections, tighten as necessary.
- Inspect all contactors and relays, replace as necessary.
- Check accuracy of thermistors, replace if greater than ± 2° F (1.2° C) variance from calibrated thermometer.
- Obtain and test an oil sample. Change oil only if necessary.
- Check to be sure that the proper concentration of antifreeze is present in the chilled water loop, if applicable.
- Verify that the chilled water loop is properly treated.
- Check refrigerant filter driers for excessive pressure drop, replace as necessary.
- Check chilled water strainers, clean as necessary.
- Check cooler heater operation, if equipped.
- Check condition of condenser fan blades and that they are securely fastened to the motor shaft.
- Perform Service Test to confirm operation of all components.
- Check for excessive cooler approach (Leaving Chilled Water Temperature — Saturated Suction Temperature) which may indicate fouling. Clean cooler vessel if necessary.

Microchannel Heat Exchanger (MCHX) Condenser Coil Maintenance and Cleaning Recommendations

> ⚠ **CAUTION**
>
> Do not apply any chemical cleaners to MCHX condenser coils. These cleaners can accelerate corrosion and damage the coil.

Routine cleaning of coil surfaces is essential to maintain proper operation of the unit. Elimination of contamination and removal of harmful residues will greatly increase the life of the coil and extend the life of the unit. The following steps should be taken to clean MCHX condenser coils:

1. Remove any foreign objects or debris attached to the coreface or trapped within the mounting frame and brackets.

2. Put on personal protective equipment including safety glasses and/or face shield, waterproof clothing and gloves. It is recommended to use full coverage clothing.

3. Start high pressure water sprayer and purge any soap or industrial cleaners from sprayer before cleaning condenser coils. Only clean, potable water is authorized for cleaning condenser coils.

4. Clean condenser face by spraying the core steady and uniformly from top to bottom while directing the spray straight toward the core. Do not exceed 900 psig or 30 degree angle. The nozzle must be at least 12 in. from the core face. Reduce pressure and use caution to prevent damage to air centers.

> ⚠ **CAUTION**
>
> Excessive water pressure will fracture the braze between air centers and refrigerant tubes.

TROUBLESHOOTING

Complete Unit Stoppage and Restart — Possible causes for unit stoppage and reset methods are shown below and in Table 41. Refer to Fig. 3-7 for component arrangement and control wiring diagrams.

GENERAL POWER FAILURE — After power is restored, restart is automatic through normal MBB start-up.

UNIT ENABLE-OFF-REMOTE CONTACT SWITCH IS OFF — When the switch is OFF, the unit will stop immediately. Place the switch in the ENABLE position for local switch control or in the REMOTE CONTACT position for control through remote contact closure.

CHILLED FLUID PROOF-OF-FLOW SWITCH OPEN — After the problem causing the loss of flow has been corrected, reset is manual by resetting the alarm with the scrolling marquee as shown in Table 42.

OPEN 24-V CONTROL CIRCUIT BREAKER(S) — Determine the cause of the failure and correct. Reset circuit breaker(s). Restart is automatic after MBB start-up cycle is complete.

COOLING LOAD SATISFIED — Unit shuts down when cooling load has been satisfied. Unit restarts when required to satisfy leaving fluid temperature set point.

THERMISTOR FAILURE — If a thermistor fails in either an open or shorted condition, the unit will be shut down. Replace EWT, LWT, or OAT as required. Unit restarts automatically, but must be reset manually by resetting the alarm with the scrolling marquee as shown in Table 42.

> ⚠ **CAUTION**
>
> If unit stoppage occurs more than once as a result of any of the safety devices listed, determine and correct cause before attempting another restart.

LOW SATURATED SUCTION — Several conditions can lead to low saturated suction alarms and the chiller controls have several override modes built in which will attempt to keep the chiller from shutting down. Low fluid flow, low refrigerant charge and plugged filter driers are the main causes for this condition. To avoid permanent damage and potential freezing of the system, do NOT repeatedly reset these alert and/or alarm conditions without identifying and correcting the cause(s).

COMPRESSOR SAFETIES — The 30RAP units with *Comfort*Link™ controls include a compressor protection board that protects the operation of each of the compressors. Each board senses the presence or absence of current to each compressor.

If there is a command for a compressor to run and there is no current, then one of the following safeties or conditions have turned the compressor off:

Compressor Overcurrent — All compressors have internal line breaks or a motor protection device located in the compressor electrical box.

Compressor Short Circuit — There will not be current if the compressor circuit breaker that provides short circuit protection has tripped.

Compressor Motor Over Temperature — The internal line-break or over temperature switch has opened.

High-Pressure Switch Trip — The high pressure switch has opened. Below are the factory settings for the fixed high pressure switch.

30RAP UNIT SIZE	CUTOUT		CUT-IN	
	psig	kPa	psig	kPa
010-060	650	4482	500	3447

ASTP Protection Trip — All non-digital Copeland compressors are equipped with an advanced scroll temperature protection (ASTP). A label located above the terminal box identifies models that contain this technology. See Fig. 34.

Fig. 34 — Advanced Scroll Temperature Protection Label

Advanced scroll temperature protection is a form of internal discharge temperature protection that unloads the scroll compressor when the internal temperature reaches approximately 300 F. At this temperature, an internal bi-metal disk valve opens and causes the scroll elements to separate, which stops compression. Suction and discharge pressures balance while the motor continues to run. The longer the compressor runs unloaded, the longer it must cool before the bi-metal disk resets. See Fig. 35 for approximate reset times.

To manually reset ASTP, the compressor should be stopped and allowed to cool. If the compressor is not stopped, the motor will run until the motor protector trips, which occurs up to 90 minutes later. Advanced scroll temperature protection will reset automatically before the motor protector resets, which may take up to 2 hours.

High Discharge Gas Temperature Protection — Units equipped with digital compressors have an additional thermistor located on the discharge line, If discharge temperature exceeds 265 F (129.4 C), the digital compressor will be shut off.

Alarms will also occur if the current sensor board malfunctions or is not properly connected to its assigned digital input. If the compressor is commanded OFF and the current sensor reads ON, an alert is generated. This will indicate that a compressor contactor has failed closed. In this case, a special mode, Compressor Stuck on Control, will be enabled and all other compressors will be turned off. An alarm will then be enabled to indicate that service is required. Outdoor fans will continue to operate. The first outdoor fan stage is turned on immediately. The other stages of fan will be turned on as required by SCT.

Alarms and Alerts — These are warnings of abnormal or fault conditions, and may cause either one circuit or the whole unit to shut down. They are assigned code numbers as described in Table 42.

Automatic alarms will reset without operator intervention if the condition corrects itself. The following method must be used to reset manual alarms:

Before resetting any alarm, first determine the cause of the alarm and correct it. Enter the Alarms mode indicated by the LED on the side of the scrolling marquee display. Press ENTER and ▼ until the sub-menu item RCRN "RESET ALL CURRENT ALARMS" is displayed. Press ENTER. The control will prompt the user for a password, by displaying PASS and WORD. Press ENTER to display the default password, 1111. Press ENTER for each character. If the password has been changed, use the arrow keys to change each individual character. Toggle the display to "YES" and press ENTER. The alarms will be reset.
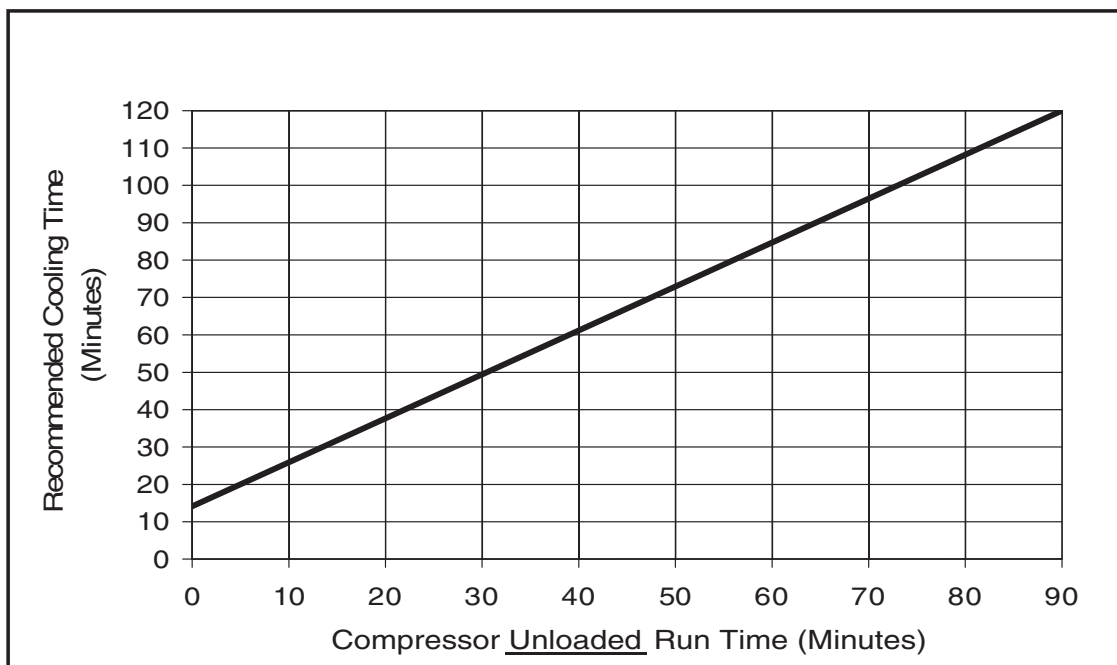
*Times are approximate.
NOTE: Various factors, including high humidity, high ambient temperature, and the presence of a sound blanket will increase cool-down times.

Fig. 35 — Recommended Minimum Cool Down Time After Compressor is Stopped*

Table 41 — Troubleshooting

SYMPTOMS	CAUSE	REMEDY
Cooler Circulating Pump Does Not Run	Power line open	Reset circuit breaker.
	Control fuse or circuit breaker open	Check control circuit for ground or short. Reset breaker and replace fuse.
	Tripped power breaker	Check the controls. Find the cause of trip and reset breaker.
	Loose terminal connection	Check connections.
	Improperly wired controls	Check wiring and rewire if necessary.
	Low line voltage	Check line voltage — determine location of voltage drop and remedy deficiency.
	Pump motor defective	Check motor winding for open or short. Replace compressor if necessary.
	Pump seized	Replace pump.
Compressor Cycles Off on Loss of Charge	Low refrigerant charge	Repair leak and recharge.
Compressor Cycles Off on Cooler Freeze Protection	Thermistor failure	Replace thermistor.
	System load was reduced faster than controller could remove stages	Unit will restart after fluid temperature rises back into the control band. Avoid rapidly removing system load.
Compressor Shuts Down on High-Pressure Control	High-pressure control acting erratically	Replace control.
	Noncondensables in system	Evacuate and recharge.
	Condenser dirty	Clean condenser.
	Fans not operating	Repair or replace if defective.
	System overcharged with refrigerant	Reduce charge.
Unit Operates Too Long or Continuously	Low refrigerant charge	Add refrigerant.
	Control contacts fused	Replace control.
	Partially plugged or plugged expansion valve or filter drier	Clean or replace as needed.
	Defective insulation	Replace or repair as needed.
	Damaged compressor	Check compressor and replace if necessary.
Unusual or Loud System Noises	Piping vibration	Support piping as required.
		Check for loose pipe connections or damaged compressor
	Compressor noisy	Replace compressor (worn bearings).
		Check for loose compressor holddown bolts.
Compressor Loses Oil	Leak in system	Repair leak.
	Mechanical damage (Failed seals or broken scrolls)	Replace compressor.
	Oil trapped in line	Check piping for oil traps.
Hot Liquid Line	Shortage of refrigerant due to leak	Repair leak and recharge.
Frosted Liquid Line	Restricted filter drier	Replace filter drier.
Frosted Suction Line	Expansion valve admitting excess refrigerant (note: this is a normal condition for brine applications)	Replace valve if defective.
	Stuck EXV	Replace valve if defective.
Freeze-Up	Improper charging	Make sure a full quantity of fluid is flowing through the cooler while charging, and suction pressure in cooler is equal to or greater than pressure corresponding to 32 F (0° C).
	System not drained for winter shutdown	Recommended that system be filled with an appropriate glycol mixture to prevent freezing of pumps and fluid tubing.
	Loose Thermistor	Verify thermistors are fully inserted in wells.

Table 42 — Alarm and Alert Codes

ALARM/ ALERT CODE	ALARM OR ALERT	DESCRIPTION	WHY WAS THIS ALARM GENERATED?	ACTION TAKEN BY CONTROL	RESET METHOD	PROBABLE CAUSE
T051	Alert	Circuit A, Compressor 1 Failure	Compressor feedback signal does not match relay state	Compressor A1 shut down.	Manual	High-pressure switch open, faulty CSB, loss of condenser air, filter drier plugged, non-condensables, operation beyond capability.
A051	Alarm	Circuit A, Compressor 1 Failure	Respective current sensor board (CSB) feedback signal is ON when the compressor should be off	Unit shut down	Manual	Welded compressor contactor, CSB wiring error.
T052	Alert	Circuit A, Compressor 2 Failure	Compressor feedback signal does not match relay state	Compressor A2 shut down.	Manual	High-pressure switch open, faulty CSB, loss of condenser air, filter drier plugged, non-condensables, operation beyond capability.
A052	Alarm	Circuit A, Compressor 2 Failure	Respective current sensor board (CSB) feedback signal is ON when the compressor should be off	Unit shut down	Manual	Welded compressor contactor, CSB wiring error.
T055	Alert	Circuit B, Compressor 1 Failure	Compressor feedback signal does not match relay state	Compressor B1 shut down.	Manual	High-pressure switch open, faulty CSB, loss of condenser air, filter drier plugged, non-condensables, operation beyond capability.
A055	Alarm	Circuit B, Compressor 1 Failure	Respective current sensor board (CSB) feedback signal is ON when the compressor should be off	Unit shut down	Manual	Welded compressor contactor, CSB wiring error.
T056	Alert	Circuit B, Compressor 2 Failure	Compressor feedback signal does not match relay state	Compressor B2 shut down.	Manual	High-pressure switch open, faulty CSB, loss of condenser air, filter drier plugged, non-condensables, operation beyond capability.
A056	Alarm	Circuit B, Compressor 2 Failure	Respective current sensor board (CSB) feedback signal is ON when the compressor should be off	Unit shut down	Manual	Welded compressor contactor, CSB wiring error.
A060	Alarm	Cooler Leaving Fluid Thermistor Failure	Thermistor outside range of –40 to 245 F (–40 to 118 C)	Chiller shut down immediately	Automatic	Thermistor failure, damaged cable/wire or wiring error.
A061	Alarm	Cooler Entering Fluid Thermistor Failure	Thermistor outside range of –40 to 245 F (–40 to 118 C)	Chiller shut down immediately	Automatic	Thermistor failure, damaged cable/wire or wiring error.
T068	None	Circuit A Return Gas Thermistor Failure	If return gas sensors are enabled (RG.EN) and thermistor is outside range of –40 to 245 F (–40 to 118 C)	Circuit A shut down	Automatic	Thermistor failure, damaged cable/wire or wiring error.
T069	None	Circuit B Return Gas Thermistor Failure	If return gas sensors are enabled (RG.EN) and thermistor is outside range of –40 to 245 F –40 to 118 C)	Circuit B shut down	Automatic	Thermistor failure, damaged cable/wire or wiring error.
T073	Alert	Outside Air Thermistor Failure	Thermistor outside range of –40 to 245 F (–40 to 118 C)	Temperature reset disabled. Chiller runs under normal control/set points. When capacity reaches 0, cooler/pump heaters are energized.	Automatic	Thermistor failure, damaged cable/wire or wiring error.
T074	Alert	Space Temperature/Dual Chiller Thermistor Failure	Thermistor outside range of –40 to 245 F (–40 to 118 C)	Temperature reset disabled. Chiller runs under normal control/set points.	Automatic	Thermistor failure, damaged cable/wire or wiring error.
T077	Alert	Circuit A Saturated Suction Temperature exceeds Cooler Leaving Fluid Temperature	Faulty expansion valve, suction pressure transducer or leaving fluid thermistor.	Circuit A shutdown after pumpdown complete.	Automatic	Faulty expansion valve or suction pressure transducer or leaving fluid thermistor.
T078	Alert	Circuit B Saturated Suction Temperature exceeds Cooler Leaving Fluid Temperature	Faulty expansion valve, suction pressure transducer or leaving fluid thermistor.	Circuit B shutdown after pumpdown complete	Automatic	Faulty expansion valve or suction pressure transducer or leaving fluid thermistor.
T079	Alert	Lead/Lag LWT Thermistor Failure	Thermistor outside range of –40 to 245 F (–40 to 118 C)	Chiller runs as a stand alone machine	Automatic	Dual LWT thermistor failure, damaged cable/wire or wiring error.
T090	Alert	Circuit A Discharge Pressure Transducer Failure	Outside of range (0 to 667 psig)	Circuit A shut down	Automatic	Transducer failure, poor connection to MBB, or wiring damage/error.
T091	Alert	Circuit B Discharge Pressure Transducer Failure	Outside of range (0 to 667 psig)	Circuit B shut down	Automatic	Transducer failure, poor connection to MBB, or wiring damage/error.
T092	Alert	Circuit A Suction Pressure Transducer Failure	Outside of range (0 to 420 psig)	Circuit A shut down	Automatic	Transducer failure, poor connection to MBB, or wiring damage/error.
T093	Alert	Circuit B Suction Pressure Transducer Failure	Outside of range (0 to 420 psig)	Circuit B shut down	Automatic	Transducer failure, poor connection to MBB, or wiring damage/error.
T094	Alert	Discharge Gas Thermistor Failure	Discharge thermistor (DTT) is either open or shorted	Digital compressor shut down.	Automatic	Thermistor failure, damaged cable/wire or wiring error.

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Table 42 — Alarm and Alert Codes (cont)

ALARM/ ALERT CODE	ALARM OR ALERT	DESCRIPTION	WHY WAS THIS ALARM GENERATED?	ACTION TAKEN BY CONTROL	RESET METHOD	PROBABLE CAUSE
T110	Alert	Circuit A Loss of Charge	If the compressors are off and discharge pressure reading is < 26 psig for 30 sec.	Circuit not allowed to start.	Manual	Refrigerant leak or transducer failure
T111	Alert	Circuit B Loss of Charge	If the compressors are off and discharge pressure reading is < 26 psig for 30 sec.	Circuit not allowed to start.	Manual	Refrigerant leak or transducer failure
T112	Alert	Circuit A High Saturated Suction Temperature	Circuit saturated suction temperature pressure transducer > 70 F (21.1 C) for 5 minutes	Circuit shut down	Manual	Faulty Expansion valve, faulty suction pressure transducer or high entering fluid temperature.
T113	Alert	Circuit B High Saturated Suction Temperature	Circuit saturated suction temperature pressure transducer > 70 F (21.1 C) for 5 minutes	Circuit shut down	Manual	Faulty Expansion valve, faulty suction pressure transducer or high entering fluid temperature.
T114	Alert	Circuit A Low Suction Superheat	Suction superheat is less than 5° F (2.8 C) for 5 minutes.	Circuit A shut down.	Automatic restart after first daily occurrence. Manual restart thereafter.	Faulty expansion valve, faulty suction pressure transducer, faulty suction gas thermistor, circuit overcharged
T115	Alert	Circuit B Low Suction Superheat	Suction superheat is less than 5° F (2.8 C) for 5 minutes.	Circuit B shut down.	Automatic restart after first daily occurrence. Manual restart thereafter.	Faulty expansion valve, faulty suction pressure transducer, faulty suction gas thermistor, circuit overcharged
T116	Alert	Circuit A Low Cooler Suction Temperature	Mode 7 caused the compressor to unload 6 consecutive times with less than a 30-minute interval between each circuit shutdown.	Circuit shut down	Manual	Faulty expansion valve, low refrigerant charge, plugged filter drier, faulty suction pressure transducer, low cooler fluid flow
T117	Alert	Circuit B Low Cooler Suction Temperature	Mode 8 caused the compressor to unload 6 consecutive times with less than a 30-minute interval between each circuit shutdown.	Circuit shut down	Manual	Faulty expansion valve, low refrigerant charge, plugged filter drier, faulty suction pressure transducer, low cooler fluid flow
T118	Alert	High Discharge Gas Temperature Alert	Discharge Thermistor (DTT) reading is greater than 250 F	Compressor A1 shut down	Automatic	Refrigerant charge, plugged filter drier, head pressure control.
A118	Alarm	High Discharge Gas Temperature	3 Discharge Gas Temperature alarms occur within a day	Compressor A1 shut down	Manual	Refrigerant charge, plugged filter drier, head pressure control.
T126	Alert	Circuit A High Discharge Pressure	Compressor operation outside of operating envelope.	Circuit shut down	Automatic, only after first 3 daily occurrences. Manual reset thereafter. Reading from OAT sensor must drop 5 F (2.8 C) before restart	Faulty transducer/high pressure switch, low/ restricted condenser airflow
T127	Alert	Circuit B High Discharge Pressure	Compressor operation outside of operating envelope.	Circuit shut down	Automatic, only after first 3 daily occurrences. Manual reset thereafter. Reading from OAT sensor must drop 5 F (2.8 C) before restart	Faulty transducer/high pressure switch, low/ restricted condenser airflow
T133	Alert	Circuit A Low Suction Pressure	Suction pressure below 34 psig for 8 seconds or below 23 psig	Circuit shut down	Automatic restart after first daily occurrence. Manual restart thereafter.	Faulty or sticking EXV, low refrigerant charge, plugged filter drier.
T134	Alert	Circuit B Low Suction Pressure	Suction pressure below 34 psig for 8 seconds or below 23 psig	Circuit shut down	Automatic restart after first daily occurrence. Manual restart thereafter.	Faulty or sticking EXV, low refrigerant charge, plugged filter drier.
A140	Alert	Reverse Rotation Detected	Incoming chiller power leads not phased correctly	Chiller not allowed to start.	Manual	Reverse any two incoming power leads to correct. Check for correct fan rotation first.
A150	Alarm	Emergency Stop	CCN emergency stop command received	Chiller shutdown without going through pumpdown.	Automatic once CCN command for EMSTOP returns to normal	CCN Network command.
A151	Alarm	Illegal Configuration	One or more illegal configurations exists.	Chiller is not allowed to start.	Manual once configuration errors are corrected	Configuration error. Check unit settings.
A152	Alarm	Unit Down Due to Failure	Both circuits are down due to alarms/alerts.	Chiller is unable to run.	Automatic once alarms/alerts are cleared that prevent the chiller from starting.	Alarm notifies user that chiller is 100% down.

Table 42 — Alarm and Alert Codes (cont)

ALARM/ALERT CODE	ALARM OR ALERT	DESCRIPTION	WHY WAS THIS ALARM GENERATED?	ACTION TAKEN BY CONTROL	RESET METHOD	PROBABLE CAUSE
T153	Alert	Real Time Clock Hardware Failure	Internal clock on MBB fails	Occupancy schedule will not be used. Chiller defaults to Local On mode.	Automatic when correct clock control restarts.	Time/Date/Month/Day/Year not properly set.
A154	Alarm	Serial EEPROM Hardware Failure	Hardware failure with MBB	Chiller is unable to run.	Manual	Main Base Board failure.
T155	Alert	Serial EEPROM Storage Failure	Configuration/storage failure with MBB	No Action	Manual	Potential failure of MBB. Download current operating software. Replace MBB if error occurs again.
A156	Alarm	Critical Serial EEPROM Storage Failure	Configuration/storage failure with MBB	Chiller is not allowed to run.	Manual	Main Base Board failure.
A157	Alarm	A/D Hardware Failure	Hardware failure with peripheral device	Chiller is not allowed to run.	Manual	Main Base Board failure.
A172	Alarm	Loss of Communication with EXV Board	MBB loses communication with EXV board	Chiller is not allowed to run.	Automatic	Wiring error, faulty wiring or failed EXV board.
T173	Alert	Loss of Communication with EMM	MBB loses communication with EMM	4 to 20 mA temperature reset disabled. Demand Limit set to 100%. 4 to 20 mA set point disabled.	Automatic	Wiring error, faulty wiring or failed Energy Management Module (EMM).
T174	Alert	4 to 20 mA Cooling Set Point Input Failure	If configured with EMM and input less than 2 mA or greater than 22 mA	Set point function disabled. Chiller controls to CSP1.	Automatic	Faulty signal generator, wiring error, or faulty EMM.
T175	Alert	Loss of Communication with the AUX Board	MBB loses communication with AUX Board.		Automatic	Wiring error, faulty wiring or failed AUX board.
T176	Alert	4 to 20 mA Temperature Reset Input Failure	If configured with EMM and input less than 2 mA or greater than 22 mA	Reset function disabled. Chiller returns to normal set point control.	Automatic	Faulty signal generator, wiring error, or faulty EMM.
T177	Alert	4 to 20 mA Demand Limit Input Failure	If configured with EMM and input less than 2 mA or greater than 22 mA	Demand limit function disabled. Chiller returns to 100% demand limit control.	Automatic	Faulty signal generator, wiring error, or faulty EMM.
A189	Alarm	Cooler Pump Auxiliary Contact Inputs Miswired	Pump 1 Auxiliary Contacts are closed when Pump 2 output is energized or if Pump 2 Auxiliary Contacts are closed when Pump 1 output is energized.	Both pump outputs are turned off.	Manual	Wiring error, faulty pump contactor auxiliary contacts.
T190	Alert	Cooler Pump 1 Aux Contacts Failed to Close at Start-Up	Pump 1 Auxiliary Contacts did not close within 26 seconds after pump was started	Pump 1 turned off. Pump 2 will be started if available.	Manual	Wiring error, faulty contacts on pump contactor
T191	Alert	Cooler Pump 2 Aux Contacts Failed to Close at Start-Up	Pump 2 Auxiliary Contacts did not close within 26 seconds after pump was started	Pump 2 turned off. Pump 1 will be started if available.	Manual	Wiring error, faulty contacts on pump contactor
T192	Alert	Cooler Pump 1 Failed to Provide Flow at Start-Up	Pump 1 did not provide flow to close flow switch within 60 seconds	Pump 1 turned off. Pump 2 will be started if available.	Manual	Wiring error, pump circuit breaker tripped, contactor failure
T193	Alert	Cooler Pump 2 Failed to Provide Flow at Start-Up	Pump 2 did not provide flow to close flow switch within 60 seconds	Pump 1 turned off. Pump 2 will be started if available.	Manual	Wiring error, pump circuit breaker tripped, contactor failure
T194	Alert	Cooler Pump 1 Aux Contacts Opened During Normal Operation	Pump 1 Auxiliary Contacts open for 26 seconds after initially made. All compressors shut down. Pump 1 turned off.	Pump 2 will be started if available. Chiller allowed to run if Pump 2 successfully starts.	Manual	Wiring error, faulty contacts on pump contactor
T195	Alert	Cooler Pump 2 Aux Contacts Opened During Normal Operation	Pump 2 Auxiliary Contacts open for 26 seconds after initially made. All compressors shut down. Pump 2 turned off.	Pump 1 will be started if available. Chiller allowed to run if Pump 1 successfully starts.	Manual	Wiring error, faulty contacts on pump contactor
T196	Alert	Flow Lost While Pump 1 Running	Cooler flow switch contacts open for 3 seconds after initially made	All compressors shut down. Pump 1 turned off. Pump 2 will be started if available. Chiller allowed to run if Pump 2 successfully starts and flow switch is closed.	Manual	Wiring error, pump circuit breaker tripped, contactor failure

Table 42 — Alarm and Alert Codes (cont)

ALARM/ ALERT CODE	ALARM OR ALERT	DESCRIPTION	WHY WAS THIS ALARM GENERATED?	ACTION TAKEN BY CONTROL	RESET METHOD	PROBABLE CAUSE
T197	Alert	Flow Lost While Pump 2 Running	Cooler flow switch contacts open for 3 seconds after initially made	All compressors shut down. Pump 2 turned off. Pump 1 will be started if available. Chiller allowed to run if Pump 1 successfully starts and flow switch is closed.	Manual	Wiring error, pump circuit breaker tripped, contactor failure
T198	Alert	Cooler Pump 1 Aux Contacts Closed While Pump Off	Pump 1 Auxiliary Contacts closed for 26 seconds when pump state is off	Chiller not allowed to start	Automatic when aux contacts open	Wiring error, faulty pump contactor (welded contacts)
T199	Alert	Cooler Pump 2 Aux Contacts Closed While Pump Off	Pump 2 Auxiliary Contacts closed for 26 seconds when pump state is off	Chiller not allowed to start	Automatic when aux contacts open	Wiring error, faulty pump contactor (welded contacts)
T200	Alert	Cooler Flow/Interlock Contacts Failed to Close at Start-Up	Cooler flow switch contacts failed to close within 1 minute (if cooler pump control is enabled) or within 5 minutes (if cooler pump control is not enabled) after start-up	Chiller not allowed to start. For models with dual pumps, the second pump will be started if available	Manual	Wiring error, pump circuit breaker tripped, contactor failure, faulty flow switch or interlock
A201	Alarm	Cooler Flow/Interlock Contacts Opened During Normal Operation	Flow switch opens for at least 3 seconds after being initially closed	All compressors shut down. For models with dual pumps, the second pump will be started if available	Manual	Cooler pump failure, faulty flow switch or interlock, pump circuit breaker tripped
A202	Alarm	Cooler Pump Interlock Closed When Pump is Off	If configured for cooler pump control and flow switch input is closed for 5 minutes while pump output(s) are off	Chiller shut down	Automatic when aux contacts open	Wiring error, faulty pump contactor (welded contacts)
T203	Alert	Loss of Communication with Slave Chiller	Master chiller MBB loses communication with slave chiller MBB	Dual chiller control disabled. Chiller runs as a stand-alone machine.	Automatic	Wiring error, faulty wiring, failed Slave chiller MBB module, power loss at slave chiller, wrong slave address.
T204	Alert	Loss of Communication with Master Chiller	Slave chiller MBB loses communication with master chiller MBB	Dual chiller control disabled. Chiller runs as a stand-alone machine	Automatic	Wiring error, faulty wiring, failed master chiller MBB module, power loss at Master chiller.
T205	Alert	Master and Slave Chiller with Same Address	Master and slave chiller have the same CCN address (CCN.A)	Dual chiller routine disabled. Master/slave run as stand-alone chillers.	Automatic	CCN Address for both chillers is the same. Must be different. Check CCN.A under the OPT2 sub-mode in Configuration at both chillers.
T206	Alert	High Leaving Chilled Water Temperature	LWT read is greater than LCW Alert Limit, Total capacity is 100% and LWT is greater than LWT reading one minute ago	Alert only. No action taken.	Automatic	Building load greater than unit capacity, low water/brine flow or compressor fault. Check for other alarms/alerts.
A207	Alarm	Cooler Freeze Protection	Cooler EWT or LWT is less than Brine Freeze (BR.FZ)	Chiller shutdown without going through pumpdown. Cooler pump continues to run a minimum of 5 minutes (if control enabled).	Both EWT and LWT must be at least 6 F (3.3 C) above Brine Freeze point (BR.FZ). Automatic for first, Manual reset thereafter.	Faulty thermistor, low water flow.
A208	Alarm	EWT or LWT Thermistor failure	Cooler EWT is less than LWT by 3° F (1.7° C) for 1 minute after a circuit is started	Chiller shutdown. Cooler pump shut off (if control enabled).	Manual	Faulty cooler pump, low water flow, plugged fluid strainer.
T300	Alert	Cooler Pump 1 Scheduled Maintenance Due	Pump 1 Service Countdown (P.1.DN) expired. Complete pump 1 maintenance and enter 'YES' for Pump 1 Maintenance Done (P.1.MN) item.	None	Automatic	Routine pump maintenance required
T301	Alert	Cooler Pump 2 Scheduled Maintenance Due	Pump 2 Service Countdown (P.2.DN) expired. Complete pump 2 maintenance and enter 'YES' for Pump 1 Maintenance Done (P.2.MN) item.	None	Automatic	Routine pump maintenance required

Table 42 — Alarm and Alert Codes (cont)

ALARM/ ALERT CODE	ALARM OR ALERT	DESCRIPTION	WHY WAS THIS ALARM GENERATED?	ACTION TAKEN BY CONTROL	RESET METHOD	PROBABLE CAUSE
T302	Alert	Strainer Blowdown Scheduled Maintenance Due	Strainer Service Countdown (S.T.DN) expired. Complete strainer blowdown and enter 'YES' for Strainer Maintenance Done (S.T.MN) item.	None	Automatic	Routine strainer maintenance required
T303	Alert	Condenser Coil Maintenance Due	Coil Service Countdown (C.L.DN) expired. Complete condenser coil cleaning and enter 'YES' for Coil Maintenance Done (C.L.MN) item.	None	Automatic	Routine condenser coil maintenance required
T500	Alert	Current Sensor Board A1 Failure	Alert occurs when CSB output is a constant high value	Compressor A1 shut down	Automatic	CSB failure. Wiring error.
T501	Alert	Current Sensor Board A2 Failure	Alert occurs when CSB output is a constant high value	Compressor A2 shut down	Automatic	CSB failure. Wiring error.
T502	Alert	Current Sensor Board A3 Failure	Alert occurs when CSB output is a constant high value	Compressor A3 shut down	Automatic	CSB failure. Wiring error.
T503	Alert	Current Sensor Board B1 Failure	Alert occurs when CSB output is a constant high value	Compressor B1 shut down	Automatic	CSB failure. Wiring error.
T504	Alert	Current Sensor Board B2 Failure	Alert occurs when CSB output is a constant high value	Compressor B2 shut down	Automatic	CSB failure. Wiring error.
T505	Alert	Current Sensor Board B3 Failure	Alert occurs when CSB output is a constant high value	Compressor B3 shut down	Automatic	CSB failure. Wiring error.
T950	Alert	Loss of Communication with Water System Manager	No communications have been received by the MBB within 5 minutes of last transmission	WSM forces removed. Chiller runs under own control	Automatic	Failed module, wiring error, failed transformer, loose connection plug, wrong address
T951	Alert	Loss of Communication with Chillervisor System Manager	No communications have been received by the MBB within 5 minutes of last transmission	CSM forces removed. Chiller runs under own control	Automatic	Failed module, wiring error, failed transformer, loose connection plug, wrong address
T952	Alert	Loss of Communication with Hydronic System Manager	No communications have been received by the MBB within 5 minutes of last transmission	HSM forces removed. Chiller runs under own control	Automatic	Failed module, wiring error, failed transformer, loose connection plug, wrong address

LEGEND FOR TABLE 42

CCN	—	Carrier Comfort Network
CSB	—	Current Sensor Board
EEPROM	—	Electronic Eraseable Programmable Read Only Memory
EMM	—	Energy Management Module
EWT	—	Entering Fluid Temperature
EXV	—	Electronic Expansion Valve
HSM	—	Hydronic System Manager
LCW	—	Leaving Chilled Water
LWT	—	Leaving Fluid Temperature
MBB	—	Main Base Board
OAT	—	Outdoor-Air Temperature
SCT	—	Saturated Condensing Temperature
WSM	—	Water System Manager

COMPRESSOR FAILURE ALERTS

T051, T052 (Circuit A Compresser Failures)

T055, T056 (Circuit B Compressor Failures) — Alert codes 051, 052, 055, and 056 are for compressors A1, A2, B1, and B2 respectively. These alerts occur when the current sensor (CS) does not detect compressor current during compressor operation. When this occurs, the control turns off the compressor.

If the current sensor board reads OFF while the compressor relay has been commanded ON, an alert is generated.

POSSIBLE CAUSES

Compressor Overload — Either the compressor internal overload protector is open or the external overload protector (Kriwan module) has activated. The external overload protector modules are mounted in the compressor wiring junction box. Temperature sensors embedded in the compressor motor windings are the inputs to the module. The module is powered with 24 vac from the units main control box. The module output is a normally closed contact that is wired in series with the compressor contactor coil. In a compressor motor overload condition, contact opens, deenergizing the compressor contactor.

Low Refrigerant Charge — If the compressor operates for an extended period of time with low refrigerant charge, the compressor ASTP device will open, which will cause the compressor to trip on its overload protection device.

Circuit Breaker Trip — The compressors are protected from short circuit by a breaker in the control box.

Wiring Error — A wiring error might not allow the compressor to start.

To check out alerts T051-T056:

1. Turn on the compressor in question using Service Test mode. If the compressor does not start, then most likely the problem is one of the following: HPS open, open internal protection, circuit breaker trip, incorrect safety wiring, or incorrect compressor wiring.

2. If the compressor does start, verify it is rotating in the correct direction.

IMPORTANT: Prolonged operation in the wrong direction can damage the compressor. Correct rotation can be verified by a gage set and looking for a differential pressure rise on start-up.

IMPORTANT: If the CS is always detecting current, verify that the compressor is on. If the compressor is on, check the contactor and the relay on the MBB. If the compressor is off and there is no current, verify the CSB wiring and replace if necessary.

IMPORTANT: Return to Normal mode and observe compressor operation to verify that compressor current sensor is working and condenser fans are energized.

COMPRESSOR STUCK ON FAILURE ALARMS

Circuit A A051, A052

Circuit B A055, A056 — Alarm codes 051, 052, 055, and 056 are for compressors A1, A2, B1, and B2. These alarms occur when the CSB detects current when the compressor should be off. When this occurs, the control turns off the compressor.

If the current sensor board reads ON while the compressor relay has been commanded OFF for a period of 4 continuous seconds, an alarm is generated. These alarms are only monitored for a period of 10 seconds after the compressor relay has been commanded OFF. This is done to facilitate a service technician forcing a relay to test a compressor.

In addition, if a compressor stuck failure occurs and the current sensor board reports the compressor and the request off, certain diagnostics will take place as follows:

1. If any of the compressors are diagnosed as stuck on and the current sensor board is on and the request is off, the control will command the condenser fans to maintain normal head pressure.

2. The control will shut-off all other compressors.

   The possible causes include welded contactor or frozen compressor relay on the MBB.

   To check out alarms A051-A056:

1. Place the unit in Service Test mode. All compressors should be off.

2. Verify that there is not 24-v at the contactor coil. If there is 24 v at the contactor, check relay on MBB and wiring.

3. Check for welded contactor.

4. Verify CSB wiring.

5. Return to Normal mode and observe compressor operation to verify that compressor current sensor is working and condenser fans are energized.

A060 (Cooler Leaving Fluid Thermistor Failure) — The sensor reading is outside the range of –40 to 245 F (–40 to 118 C) then the alarm will occur. The cause of the alarm is usually a faulty thermistor, a shorted or open thermistor caused by a wiring error, or a loose connection. Failure of this thermistor will shut down the entire unit.

A061 (Cooler Entering Thermistor Failure) — If the sensor reading is outside the range of –40 to 240 F (–40 to116 C) then the alarm will occur. The cause of the alarm is usually a faulty thermistor, a shorted or open thermistor caused by a wiring error, or a loose connection. Failure of this thermistor will shut down the entire unit.

T068, T69 (Circuit A,B Compressor Return Gas Temperature Thermistor Failure) — This alert occurs when the compressor return gas temperature sensor is outside the range of –40 to 240 F (–40 to 116 C). Failure of this thermistor will shut down the appropriate circuit.

T073 (Outside Air Temperature Thermistor Failure) — This alert occurs when the outside air temperature sensor is outside the range of –40 to 240 F (–40 to 116 C). Failure of this thermistor will disable any elements of the control which requires its use.

T074 (Space Temperature Thermistor Failure) — This alert occurs when the space temperature sensor is outside the range

of –40 to 245 F (–40 to 118 C). Failure of this thermistor will disable any elements of the control which requires its use. The cause of the alert is usually a faulty thermistor in the T55, or T58 device, a shorted or open thermistor caused by a wiring error, or a loose connection.

T090 (Circuit A Discharge Pressure Transducer Failure)

T091 (Circuit B Discharge Pressure Transducer Failure) — Alert codes 090 and 091 are for circuits A and B respectively. These alerts occur when the pressure is outside the range of 0.0 to 667.0 psig. A circuit cannot run when this alert is active. Use the scrolling marquee to reset the alert. The cause of the alert is usually a faulty transducer, faulty 5-v power supply, or a loose connection.

T092 (Circuit A Suction Pressure Transducer Failure)

T093 (Circuit B Suction Pressure Transducer Failure) — Alert codes 092 and 093 are for circuits A and B respectively. These alerts occur when the pressure is outside the range of 0.0 to 420.0 psig. A circuit cannot run when this alert is active. Use the scrolling marquee to reset the alert. The cause of the alert is usually a faulty transducer, faulty 5-v power supply, or a loose connection.

T094 (Discharge Gas Thermistor Failure) — This alert occurs for units which have the digital compressor installed on circuit A. If discharge gas temperature is open or shorted, the circuit will be shutoff. The alert will reset itself when discharge temperature is less than 250 F (121.1 C). The cause of the alert is usually low refrigerant charge or a faulty thermistor.

T110 (Circuit A Loss of Charge)

T111 (Circuit B Loss of Charge) — Alert codes 110 and 111 are for circuits A and B respectively. These alerts occur when the compressor is OFF and the discharge pressure is less than 26 psig.

T112 (Circuit A High Saturated Suction Temperature)

T113 (Circuit B High Saturated Suction Temperature) — Alert codes 112 and 113 occur when compressors in a circuit have been running for at least 5 minutes and the circuit saturated suction temperature is greater than 70 F (21.1 C). The high saturated suction alert is generated and the circuit is shut down.

T114 (Circuit A Low Superheat)

T115 (Circuit B Low Superheat) — Alert codes 114 and 115 occur when the superheat of a circuit is less than 5 F (2.8 C) for 5 continuous minutes. The low superheat alert is generated and the circuit is shut down.

T116 (Circuit A Low Cooler Suction Temperature)

T117 (Circuit B Low Cooler Suction Temperature) — Alert codes 116 and 117 are for circuits A and B respectively. These alerts are generated if the capacity stages are reduced three times without a 30 minute interval between capacity reductions due to operating mode 7 or mode 8.

T118 (High Discharge Gas Temperature Alert)

A118 (High Discharge Gas Temperature Alarm) — This alert or alarm occurs for units which have the digital compressor installed on circuit A. If discharge gas temperature is greater than 268 F (131.1 C), the circuit will be shut off. The alert will reset itself when discharge temperature is less than 250 F (121.1 C). If this alert occurs 3 times within a day, the A118 alarm will be generated and the alarm must be reset manually. The cause of the alert is usually low refrigerant charge or a faulty thermistor.

T126 (Circuit A High Head Pressure)

T127 (Circuit B High Head Pressure) — Alert codes 126 and 127 are for circuits A and B respectively. These alerts occur when the appropriate saturated condensing temperature is greater than the operating envelope shown in Fig 14. Prior to the alert, the control will shut down one compressor on a circuit if that circuit's saturated condensing temperature is greater than the maximum SCT minus 5° F (2.7° C). If SCT continues to

rise to greater than the maximum SCT, the alert will occur and the circuit's remaining compressor will shut down. The cause of the alarm is usually an overcharged system, high outdoor ambient temperature coupled with dirty outdoor coil, plugged filter drier, or a faulty high-pressure switch.

T133 (Circuit A Low Suction Pressure)

T134 (Circuit B Low Suction Pressure) — Alert codes 133 and 134 are for circuits A and B respectively. These alerts are generated if one of the two following conditions is satisfied: the circuit suction pressure is below 34 psig (234.4 kPa) for 8 seconds, or the suction pressure is below 23 psig (158.6 kPa). The cause of this alert may be low refrigerant charge, plugged liquid line filter drier, or sticking EXV. Check head pressure operation. If not equipped, consider adding low ambient temperature head pressure control.

Add wind baffles if required.

A140 (Reverse Rotation Detected) — A test is made once, on power up, for suction pressure change on the first activated circuit. The unit control determines failure as follows:

1. The suction pressure of both circuits is sampled 5 seconds before the compressor is brought on, right when the compressor is brought on and 5 seconds afterwards.

2. The rate of suction pressure change from 5 seconds before the compressor is brought on to when the compressor is brought on is calculated.

3. The rate of suction pressure change from when the compressor is brought on to 5 seconds afterwards is calculated.

4. With the above information, the test for reverse rotation is made. If the suction pressure change 5 seconds after compression is greater than the suction pressure change 5 seconds before compression – 1.25, then there is a reverse rotation error.

This alarm will disable mechanical cooling and will require manual reset.

A150 (Unit is in Emergency Stop) — If the CCN emergency stop command is received, the alarm is generated and the unit will be immediately stopped.

If the CCN point name "EMSTOP" in the system table is set to emergency stop, the unit will shut down immediately and broadcast an alarm back to the CCN, indicating that the unit is down. This alarm will clear when the variable is set back to "enable."

A151 (Illegal Configuration) — An A151 alarm indicates an invalid configuration has been entered. The following are illegal configurations.

• Invalid unit size has been entered.
• Dual thermostat configured for single-circuit unit.
• Dual thermostat and switch demand limit configure
• AUX board incorrect revision.
• Unit configuration set to invalid type.

A152 (Unit Down Due to Failure) — Both circuits are off due to alerts and/or alarms. Reset is automatic when all alarms are cleared. This alarm indicates the unit is at 0% capacity.

T153 (Real Time Clock Hardware Failure) — A problem has been detected with MBB real time clock hardware. Try resetting the power and check the indicator lights. If the alarm continues, the board should be replaced.

A154 (Serial EEPROM Hardware Failure) — A problem has been detected with the EEPROM on the MBB. Try resetting the power and check the indicator lights. If the alarm continues, the board should be replaced.

T155 (Serial EEPROM Storage Failure Error) — A problem has been detected with the EEPROM storage on the MBB. Try resetting the power and check the indicator lights. If the alert continues, the board should be replaced.

A156 (Critical Serial EEPROM Storage Failure Error) — A problem has been detected with the EEPROM storage on the MBB. Try resetting the power and check the indicator lights. If the alarm continues, the board should be replaced.

A157 (A/D Hardware Failure) — A problem has been detected with A/D conversion on the boards. Try resetting the power and check the indicator lights. If the alarm continues, the board should be replaced.

A172 (Loss of Communication with the EXV Board) — This alarm indicates that there are communications problems with the EXV board. The alarm will automatically reset.

T173 (Energy Management Module Communication Failure) — This alert indicates that there are communications problems with the energy management. All functions performed by the EMM will stop, which can include demand limit, reset and capacity input. The alarm will automatically reset.

T174 (4 to 20 mA Cooling Set Point Input Failure) — This alert indicates a problem has been detected with cooling set point 4 to 20 mA input. The input value is either less than 2 mA or greater than 22 mA.

T175 (Loss of Communication with the AUX Board) — This alarm indicates that there are communications problems with the AUX board. All functions performed by the AUX board will stop, which can include digital scroll unloader operation and low ambient head pressure control. The alarm will automatically reset.

T176 (4 to 20 mA Reset Input Failure) — This alert indicates a problem has been detected with reset 4 to 20 mA input. The input value is either less than 2 mA or greater than 22 mA. The reset function will be disabled when this occurs.

T177 (4 to 20 mA Demand Limit Input Failure) — This alert indicates a problem has been detected with demand limit 4 to 20 mA input. The input value is either less than 2 mA or greater than 22 mA. The reset function will be disabled when this occurs.

T500, T501 (Current Sensor Board Failure — A xx Circuit A)

T503, T504 (Current Sensor Board Failure — B xx Circuit B) — Alert codes 500, 501, 503, and 504 are for compressors A1, A2, B1, and B2 respectively. These alerts occur when the output of the CSB is a constant high value. These alerts reset automatically. If the problem cannot be resolved, the CSB must be replaced.

APPENDIX A — DISPLAY TABLES

Run Status Mode and Sub-Mode Directory

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
		AUTO VIEW OF RUN STATUS		
	EWT	xxx.x ºF	Entering Fluid Temp	
	LWT	xxx.x ºF	Leaving Fluid Temp	
	SETP	xxx.x ºF	Active Set Point	
	CTPT	xxx.x ºF	Control Point	
	LOD.F	xxx	Load/Unload Factor	
	STAT		Control Mode	0=Service Test 1=Off Local 2=Off CCN 3=Off Time 4=Off Emrgcy 5=On Local 6=On CCN 7=On Time
VIEW	LD.PM		Lead Pump	
	OCC	YES/NO	Occupied	
	LS.AC	YES/NO	Low Sound Active	
	MODE	YES/NO	Override Modes in Effect	
	CAP	xxx	Percent Total Capacity	
	STGE	x	Requested Stage	
	ALRM	xxx	Current Alarms & Alerts	
	TIME	xx.xx	Time of Day	00:00-23:59
	MNTH	xx	Month of Year	1 - 12 (1 = January, 2 = February, etc.)
	DATE	xx	Day of Month	01-31
	YEAR	xx	Year of Century	
		UNIT RUN HOUR AND START		
RUN	HRS.U	xxxx HRS	Machine Operating Hours	
	STR.U	xxxx	Machine Starts	
	HR.P1	xxxx HRS	Pump 1 Run Hours	
	HR.P2	xxxx HRS	Pump 2 Run Hours	
		CIRC AND COMP RUN HOURS		
	HRS.A	xxxx HRS	Circuit A Run Hours	
	HRS.B	xxxx HRS	Circuit B Run Hours	
HOUR	HR.A1	xxxx HRS	Compressor A1 Run Hours	
	HR.A2	xxxx HRS	Compressor A2 Run Hours	
	HR.B1	xxxx HRS	Compressor B1 Run Hours	
	HR.B2	xxxx HRS	Compressor B2 Run Hours	

Run Status Mode and Sub-Mode Directory (cont)

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
			COMPRESSOR STARTS	
STRT	ST.A1	xxxx	Compressor A1 Starts	
	ST.A2	xxxx	Compressor A2 Starts	
	ST.B1	xxxx	Compressor B1 Starts	
	ST.B2	xxxx	Compressor B2 Starts	
			PREVENTIVE MAINTENANCE	
	PUMP		PUMP MAINTENANCE	
	SI.PM	xxxx HRS	Pump Service Interval	
	P.1.DN	xxxx HRS	Pump 1 Service Countdown	
	P.2.DN	xxxx HRS	Pump 2 Service Countdown	
	P.1.MN	YES/NO	Pump 1 Maintenance Done	User Entry
	P.2.MN	YES/NO	Pump 2 Maintenance Done	User Entry
	PMDT		PUMP MAINTENANCE DATES	
	P.1.M0		MM/DD/YY HH:MM	
	P.1.M1		MM/DD/YY HH:MM	
	P.1.M2		MM/DD/YY HH:MM	
	P.1.M3		MM/DD/YY HH:MM	
	P.1.M4		MM/DD/YY HH:MM	
	P.2.M0		MM/DD/YY HH:MM	
	P.2.M1		MM/DD/YY HH:MM	
	P.2.M2		MM/DD/YY HH:MM	
	P.2.M3		MM/DD/YY HH:MM	
	P.2.M4		MM/DD/YY HH:MM	
PM	STRN		STRAINER MAINTENANCE	
	SI.ST	xxxx HRS	Strainer Srvc Interval	
	S.T.DN	xxxx HRS	Strainer Srvc Countdown	
	S.T.MN	YES/NO	Strainer Maint. Done	User Entry
	ST.DT		STRAINER MAINTENANCE DATES	
	S.T.M0		MM/DD/YY HH:MM	
	S.T.M1		MM/DD/YY HH:MM	
	S.T.M2		MM/DD/YY HH:MM	
	S.T.M3		MM/DD/YY HH:MM	
	S.T.M4		MM/DD/YY HH:MM	
	COIL		COIL MAINTENANCE	
	SI.CL	xxxx HRS	Coil Cleaning Srvc Int	
	C.L.DN	xxxx HRS	Coil Service Countdown	
	C.L.MN	YES/NO	Coil Cleaning Maint.Done	User Entry
	CL.DT		COIL MAINTENANCE DATES	
	C.L.M0		MM/DD/YY HH:MM	
	C.L.M1		MM/DD/YY HH:MM	
	C.L.M2		MM/DD/YY HH:MM	
	C.L.M3		MM/DD/YY HH:MM	
	C.L.M4		MM/DD/YY HH:MM	
			SOFTWARE VERSION NUMBERS	
	MBB		CESR131460-XXXXX	
	EXV		CESR131172-XXXXX	
VERS	AUX1		CESR131333-XXXXX	
	EMM		CESR131174-XXXXX	
	MARQ		CESR131171-XXXXX	
	NAVI		CESR130227-XXXXX	

APPENDIX A — DISPLAY TABLES (cont)

Service Test Mode and Sub-Mode Directory

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
TEST			Service Test Mode	To enable Service Test mode, move Enable/Off/Remote contact switch to OFF. Change TEST to ON. Move switch to ENABLE
OUTS	OUTPUTS			
	EXV.A	xxx%	EXV % Open	
	EXV.B	xxx%	EXV % Open	
	FAN1	ON/OFF	Fan 1 Relay	
	FAN2	ON/OFF	Fan 2 Relay	
	FAN3	ON/OFF	Fan 3 Relay	
	FAN4	ON/OFF	Fan 4 Relay	
	FAN5	ON/OFF	Fan 5 Relay	
	FAN6	ON/OFF	Fan 6 Relay	
	V.HPA	xx	Var Head Press %	
	V.HPB	xx	Var Head Press %	
	CLP.1	ON/OFF	Cooler Pump Relay 1	
	CLP.2	ON/OFF	Cooler Pump Relay 2	
	UL.TM	xx	Comp A1 Unload Time	
	CL.HT	ON/OFF	Cooler/Pump Heater	
	RMT.A	ON/OFF	Remote Alarm Relay	
CMPA	CIRCUIT A COMPRESSOR TEST			
	CC.A1	ON/OFF	Compressor A1 Relay	
	UL.TM	xx	Comp A1 Unload Time	
	CC.A2	ON/OFF	Compressor A2 Relay	
	MLV	ON/OFF	Minimum Load Valve Relay	
CMPB	CIRCUIT B COMPRESSOR TEST			
	CC.B1	ON/OFF	Compressor B1 Relay	
	CC.B2	ON/OFF	Compressor B2 Relay	

Temperature Mode and Sub-Mode Directory

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
UNIT	ENTERING AND LEAVING UNIT TEMPERATURES			
	CEWT	xxx.x °F	Cooler Entering Fluid	
	CLWT	xxx.x °F	Cooler Leaving Fluid	
	OAT	xxx.x °F	Outside Air Temperature	
	SPT	xxx.x °F	Space Temperature	
	DLWT	xxx.x °F	Lead/Lag Leaving Fluid	
CIR.A	TEMPERATURES CIRCUIT A			
	SCT.A	xxx.x °F	Saturated Condensing Tmp	
	SST.A	xxx.x °F	Saturated Suction Temp	
	RGT.A	xxx.x °F	Compr Return Gas Temp	
	D.GAS	xxx.x °F	Discharge Gas Temp	
	SH.A	xxx.x ΔF	Suction Superheat Temp	
CIR.B	TEMPERATURES CIRCUIT B			
	SCT.B	xxx.x °F	Saturated Condensing Tmp	
	SST.B	xxx.x °F	Saturated Suction Temp	
	RGT.B	xxx.x °F	Compr Return Gas Temp	
	SH.B	xxx.x ΔF	Suction Superheat Temp	

Pressures Mode and Sub-Mode Directory

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
PRC.A	PRESSURES CIRCUIT A			
	DP.A	xxx.x PSIG	Discharge Pressure	
	SP.A	xxx.x PSIG	Suction Pressure	
PRC.B	PRESSURES CIRCUIT B			
	DP.B	xxx.x PSIG	Discharge Pressure	
	SP.B	xxx.x PSIG	Suction Pressure	

Set Points Mode and Sub-Mode Directory

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	RANGE	COMMENT
			COOLING SET POINTS		
COOL	CSP.1	xxx.x °F	Cooling Set Point 1	−20 to 70	Default: 44 F
	CSP.2	xxx.x °F	Cooling Set Point 2	−20 to 70	Default: 44 F
	CSP.3	xxx.x °F	ICE Set Point	−20 to 32	Default: 32 F
			HEAD PRESSURE SET POINTS		
HEAD	H.DP	xxx.x °F	Head Set Point	85 to 120	Default: 95 F
	F.ON	xxx.x °F	Fan On Set Point		Default: 95 F
	F.OFF	xxx.x °F	Fan Off Set Point		Default: 72 F
	B.OFF	xx.x	Base Fan Off Delta Temp	10 to 50	Default: 23 F
	F.DLT	xxx	Fan Stage Delta	0 to 50	Default: 15 F
FRZ			BRINE FREEZE SET POINT		
	BR.FZ	xx.x °F	Brine Freeze Point	−20 to 34	Default: 34 F

Inputs Mode and Sub-Mode Directory

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
			GENERAL INPUTS	
GEN.I	STST	ON/OFF	Start/Stop Switch	
	FLOW	ON/OFF	Cooler Flow Switch	
	PM.F.1	ON/OFF	Cooler Pump 1 Interlock	
	PM.F.2	ON/OFF	Cooler Pump 2 Interlock	
	HT.RQ	ON/OFF	Heat Request	
	DLS1	ON/OFF	Demand Limit Switch 1	
	DLS2	ON/OFF	Demand Limit Switch 2	
	ICED	ON/OFF	Ice Done	
	DUAL	ON/OFF	Dual Set Point Switch	
			CIRCUIT INPUTS	
CRCT	FKA1	ON/OFF	Compressor A1 Feedback	
	FKA2	ON/OFF	Compressor A2 Feedback	
	FKA3	ON/OFF	Compressor A3 Feedback	
	FKA4	ON/OFF	Compressor A4 Feedback	
	FKB1	ON/OFF	Compressor B1 Feedback	
	FKB2	ON/OFF	Compressor B2 Feedback	
	FKB3	ON/OFF	Compressor B3 Feedback	
	FKB4	ON/OFF	Compressor B4 Feedback	
			4-20 MA INPUTS	
4-20	DMND	xx.x	4-20 ma Demand Signal	
	RSET	xx.x	4-20 ma Reset Signal	
	CSP	xx.x	4-20 ma Cooling Set Point	

Outputs Mode and Sub-Mode Directory

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
	GENERAL OUTPUTS			
	FAN1	ON/OFF	Fan 1 Relay	
	FAN2	ON/OFF	Fan 2 Relay	
	FAN3	ON/OFF	Fan 3 Relay	
	FAN4	ON/OFF	Fan 4 Relay	
	FAN5	ON/OFF	Fan 5 Relay	
GEN.O	FAN6	ON/OFF	Fan 6 Relay	
	V.HPA	ON/OFF	Fan Speed Circuit A	
	V.HPB	ON/OFF	Fan Speed Circuit B	
	C.WP1	ON/OFF	Cooler Pump Relay 1	
	C.WP2	ON/OFF	Cooler Pump Relay 2	
	CLHT	ON/OFF	Cooler/Pump Heater	
	MLV.R	ON/OFF	Minimum Load Valve Relay	
	OUTPUTS CIRCUIT A EXV			
	EXV.A	ON/OFF	EXV % Open	
	APPR	ON/OFF	Circuit A Approach	
	AP.SP	ON/OFF	Approach Setpoint	
	X.SH.R		SH Reset at Max Unl-Dig	
	S.SH.R		Digload to Start SH RST	
A.EXV	SH_R		Amount of SH Reset	
	OVR.A	ON/OFF	EXVA Override	
	SPH.A	ON/OFF	Suction Superheat Temp	
	ASH.S	ON/OFF	Active Superheat Setpt	
	AMP.S	ON/OFF	Active Mop Setpt	
	PLM.A	ON/OFF	Cir A EXV Position Limit	
	SPR.1	ON/OFF	Spare 1 Temperature	
	OUTPUTS CIRCUIT A EXV			
	EXV.B	ON/OFF	EXV % Open	
	APPR	ON/OFF	Circuit B Approach	
	AP.SP	ON/OFF	Approach Setpoint	
B.EXV	OVR.B	ON/OFF	EXVB Override	
	SPH.B	ON/OFF	Suction Superheat Temp	
	ASH.S	ON/OFF	Active Superheat Setpt	
	AMP.S	ON/OFF	Active Mop Setpt	
	PLM.B	ON/OFF	Cir B EXV Position Limit	
	SPR.2	ON/OFF	Spare 2 Temperature	
	OUTPUTS CIRCUIT A			
	CC.A1	ON/OFF	Compressor A1 Relay	
CIR.A	DPE.R	ON/OFF	Comp A1 Load Percent	
	CC.A2	ON/OFF	Compressor A2 Relay	
	CC.A3	ON/OFF	Compressor A3 Relay	
	CC.A4	ON/OFF	Compressor A4 Relay	
	OUTPUTS CIRCUIT B			
	CC.B1	ON/OFF	Compressor B1 Relay	
CIR.B	CC.B2	ON/OFF	Compressor B2 Relay	
	CC.B3	ON/OFF	Compressor B3 Relay	
	CC.B4	ON/OFF	Compressor B4 Relay	

Configuration Mode and Sub-Mode Directory

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
			DISPLAY CONFIGURATION	
	TEST	ON/OFF	Test Display LEDs	
	METR	ON/OFF	Metric Display	Off = English On = Metric
DISP	LANG	X	Language Selection	Default: 0 0 = English 1 = Espanol 2 = Francais 3 = Portuguese
	PAS.E	ENBL/DSBL	Password Enable	
	PASS	XXXX	Service Password	
			UNIT CONFIGURATION	
	SIZE		Unit Size	
	SZA.1	XX	Compressor A1 Size	
	SZA.2	XX	Compressor A2 Size	
	SZA.3	XX	Compressor A3 Size	
	SZA.4	XX	Compressor A4 Size	
	SZB.1	XX	Compressor B1 Size	
UNIT	SZB.2	XX	Compressor B2 Size	
	SZB.3	XX	Compressor B3 Size	
	SZB.4	XX	Compressor B4 Size	
	SH.SP	XX	Suction Superheat Setpt	
	FAN.S	X	Number of Fans	Default: 5
	EXV	YES/NO	EXV Module Installed	
	A1.TY	YES/NO	Compressor A1 Digital	Default: No
	MAX.T	XX	Maximum A1 Unload Time	Default: 7 Max = 12 (010,015) Max = 10 (018-060)
			UNIT OPTIONS 1 HARDWARE	
	FLUD	X	Cooler Fluid	Default: Water 1 = Water 2 = Medium Temperature Brine
	MLV.S	YES/NO	Minimum Load Valve Select	
	CSB.E	ENBL/DSBL	Csb Boards Enable	Default: Enable
	CPC	ON/OFF	Cooler Pump Control	Default: Off
	PM1E	YES/NO	Cooler Pump 1 Enable	
	PM2E	YES/NO	Cooler Pump 2 Enable	
	PM.P.S	YES/NO	Cooler Pmp Periodic Strt	Default: No
OPT1	PM.SL	X	Cooler Pump Select	Default: Automatic 0 = Automatic 1 = Pump 1 Starts first 2 = Pump 2 Starts first
	PM.DY	XX MIN	Cooler Pump Shutdown Dly	0 to 10 minutes, Default: 1 min.
	PM.DT	XXXX HRS	Pump Changeover Hours	Default: 500 hours
	ROT.P	YES/NO	Rotate Cooler Pumps Now	User Entry
	EMM	YES/NO	EMM Module Installed	
	CND.T	X	Cnd HX Typ:0=RTPF 1=MCHX	
	MOPS	XX	EXV MOP Set Point	
	APPR	XX	Config Approach Set Point	

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
			UNIT OPTIONS 2 CONTROLS	
OPT2	CTRL	X	Control Method	Default: 0 0 = Enable/Off/Remote Switch 2 = Occupancy 3 = CCN Control
	LOAD	X	Loading Sequence Select	Default: 1 1 = Equal 2 = Staged
	LLCS	X	Lead/Lag Circuit Select	Default: 1 1 = Automatic 2 = Circuit A Leads 3 = Circuit B Leads
	LCWT	XX	High LCW Alert Limit	Default: 60 Range: 2 to 60 F
	DELY	XX	Minutes Off Time	Default: 0 Minutes Range: 0 to 15 Minutes
	ICE.M	ENBL/DSBL	Ice Mode Enable	Default: Disable
	LS.MD	X	Low Sound Mode Select	Default: 0 0 = Mode Disable 1 = Fan Noise Only 2 = Fan/Compressor Noise
	LS.ST	00:00	Low Sound Start Time	Default: 00:00
	LS.ND	00:00	Low Sound End Time	Default: 00:00
	LS.LT	XXX %	Low Sound Capacity Limit	Default: 100% Range: 0 to 100%
			CCN NETWORK CONFIGS	
CCN	CCNA	XXX	CCN Address	Default: 1 Range: 0 to 239
	CCNB	XXX	CCN Bus Number	Default: 1 Range: 0 to 239
	BAUD	X	CCN Baud Rate	Default: 3 1 = 2400 2 = 4800 3 = 9600 4 =19,200 5 =38,400
			HEAD PRESSURE CMP. DELTA	
HP.A	A1.DT	XX	SCT Delta For Comp A1	Default:12 Range: 0 to 50
	A2.DT	XX	SCT Delta For Comp A2	Default:12 Range: 0 to 50
			HEAD PRESSURE CMP. DELTA	
HP.B	B1.DT	XX	SCT Delta For Comp B1	Default:12 Range: 0 to 50
	B2.DT	XX	SCT Delta For Comp B2	Default:12 Range: 0 to 50

Configuration Mode and Sub-Mode Directory (cont)

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
			CIR A EXV CONFIGURATION	
EXV.A	STR.A	XXX	EXV CIrc.A Start Pos	Default: 50 0 to 100
	MIN.A	XXX	EXV Circ.A Min Position	Default: 8 0 to 100
	RNG.A	XXXXX	EXVA Steps In Range	0 to 65535
	SPD.A	XXXXX	EXVA STeps Per Second	Default: 200 0 to 65535
	POF.A	XXX	EXVA Fail Position In %	Default: 0 0 to 100
	MIN.A	XXXXX	EXVA Minimum Steps	Default: 0 0 to 65535
	MAX.A	XXXXX	EXVA Maximum Steps	0 to 65535
	OVR.A	XXX	EXVA Overrun Steps	Default: 167 0 to 65535
	TYP.A	0,1	EXVA Stepper Type	Default: 1 0 = UNIPOLAR 1 = BIPOLAR
	H.SCT	XXX	High SCT Threshold	Default: 115 50 to 140
	X.PCT	XX	Open EXV X% On 2nd Comp	Default: 10 0 to 30
	X.PER	XX	Move EXV X% On DISCRSOL	Default: 5 0 to 30
	A.PCT	XXX	Pre-open EXV - Fan Adding	Default: 10 0 to 100
	M.PCT	XXX	Pre-close EXV - Fan Sub	Default: 10 0 to 100
	S.PCT	XXX	Pre-close EXV - Lag Shut	Default: 10 0 to 100
	DELY	XXX	Lag Start Delay	Default: 10 0 to 100
			CIR **B** EXV CONFIGURATION	
EXV.B	STR.B	XXX	EXV CIrc.B Start Pos	Default: 50 0 to 100
	MIN.B	XXX	EXV Circ.B Min Position	Default: 8 0 to 100
	RNG.B	XXXXX	EXVB Steps In Range	0 to 65535
	SPD.B	XXXXX	EXVB STeps Per Second	Default: 200 0 to 65535
	POF.B	XXX	EXVB Fail Position In %	Default: 0 0 to 100
	MIN.B	XXXXX	EXVB Minimum Steps	Default: 0 0 to 65535
	MAX.B	XXXXX	EXVB Maximum Steps	0 to 65535
	OVR.B	XXX	EXVB Overrun Steps	Default: 167 0 to 65535
	TYP.B	0,1	EXVB Stepper Type	Default: 1 0 = UNIPOLAR 1 = BIPOLAR

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
			MOTORMASTER	
MM	MMR.S	YES/NO	Motormaster Select	Default: NO
	P.GAN	XX	Head Pressure P Gain	Default: 1 Range: 1 to 4
	I.GAN	XX.X	Head Pressure I Gain	Default: 0.1 Range: -20 to 20
	D.GAN	XX.X	Head Pressure D Gain	Default: 0.0 Range: -20 to 20
	MIN.S	XX	Minimum Fan Speed	Default: 5
			RESET COOL TEMP	
RSET	CRST	X	Cooling Reset Type	Default: 0 0 = No Reset 1 = 4 to 20 mA Input 2 = Outdoor Air Temperature 3 = Return Fluid 4 = Space Temperature
	MA.DG	XX.XΔF	4-20 - Degrees Reset	Default: 0.0 ΔF Range: -30 to 30 ΔF
	RM.NO	XXX.X °F	Remote - No Reset Temp	Default: 125 F Range: 0° to125 F
	RM.F	XXX.X °F	Remote - Full Reset Temp	Default: 0 F Range: 0° to125 F
	RM.DG	XX.X °F	Remote - Degrees Reset	Default: 0.0 ΔF Range: -30 to 30 ΔF
	RT.NO	XXX.XΔF	Return - No Reset Temp	Default: 10.0 ΔF Range: 0° to125 F
	RT.F	XXX.XΔF	Return - Full Reset Temp	Default: 0 ΔF Range: 0° to125 F
	RT.DG	XX.X °F	Return - Degrees Reset	Default: 0.0 ΔF Range: -30 to 30 ΔF
	DMDC	X	Demand Limit Select	Default: 0 0 = None 1 = Switch 2 - 4 to 20 mA Input 3 = CCN Loadshed
	DM20	XXX%	Demand Limit at 20 mA	Default: 100% Range: 0 to 100%
	SHNM	XXX	Loadshed Group Number	Default: 0 Range: 0 to 99
	SHDL	XXX%	Loadshed Demand Delta	Default: 0% Range: 0 to 60%
	SHTM	XXX	Maximum Loadshed Time	Default: 60 minutes Range: 0 to 120 minutes
	DLS1	XXX%	Demand Limit Switch 1	Default: 80% Range: 0 to 100%
	DLS2	XXX%	Demand Limit Switch 2	Default: 50% Range: 0 to 100%
	LLEN	ENBL/DSBL	Lead/Lag Chiller Enable	Default: Disable
	MSSL	SLVE/MAST	Master/Slave Select	Default: Master
	SLVA	XXX	Slave Address	Default: 2 Range: 0 to 239
	LLBL	X	Lead/Lag Balance Select	Default: Master Leads 0 = Master Leads 1 = Slave Leads 2 = Automatic
	LLBD	XXX	Lead/Lag Balance Delta	Default: 168 hours Range: 40 to 400 hours
	LLDY	XXX	Lag Start Delay	Default: 5 minutes Range: 0 to 30 minutes
	PARA	YES	Parallel Configuration	Default: YES (CANNOT BE CHANGED)

Configuration Mode and Sub-Mode Directory (cont)

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
			SETPOINT AND RAMP LOAD	
SLCT	CLSP	X	Cooling Set Point Select	Default: Single 0 = Single 1 = Dual Switch 2 = Dual CCN Occupied 3 = 4 to 20 mA Input (requires EMM)
	RL.S	ENBL/DSBL	Ramp Load Select	Default: Enable
	CRMP	ENBL/DSBL	Cooling Ramp Loading	Default: 1.0 Range: 0.3 to 2
	SCHD	XX	Schedule Number	Default: 1 Range: 1 to 99
	Z.GN	X.X	Deadband Multiplier	Default: 1 Range: 1 to 4
			SERVICE CONFIGURATION	
SERV	EN.A1	YES/NO	Enable Compressor A1	
	EN.A2	YES/NO	Enable Compressor A2	
	EN.B1	YES/NO	Enable Compressor B1	
	EN.B2	YES/NO	Enable Compressor B2	
			BROADCAST CONFIGURATION	
BCST	T.D.B	ON/OFF	CCN Time/Date Broadcast	
	OAT.B	ON/OFF	CCN OAT Broadcast	
	G.S.BC	ON/OFF	Global Schedule Broadcst	
	BC.AK	ON/OFF	CCN Broadcast Ack'er	

Time Clock Mode and Sub-Mode Directory

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
TIME			TIME OF DAY	
	HH.MM	XX.XX	Hour and Minute	Military (00:00 - 23:59)
			MONTH, DATE, DAY, AND YEAR	
DATE	MNTH	XX	Month of Year	1 - 12 (1 = January, 2 = February, etc.)
	DOM	XX	Day of Month	Range: 01 -31
	DAY	X	Day of Week	1 - 7 (1 = Sunday, 2 = Monday, etc.)
	YEAR	XXXX	Year of Century	
			DAYLIGHT SAVINGS TIME	
DST	STR.M	XX	Month	Default: 4 Range 1- 12
	STR.W	X	Week	Default: 1 Range 1- 5
	STR.D	X	Day	Default: 7 Range 1- 7
	MIN.A	XX	Minutes to Add	Default: 60 Range 0 - 99
	STP.M	XX	Month	Default: 10 Range 1- 12
	STP.W	XX	Week	Default: 5 Range 1- 5
	STP.D	XX	Day	Default: 7 Range 1- 7
	MIN.S	XX	Minutes to Subtract	Default: 60 Range 0 - 99
HOL.L			LOCAL HOLIDAY SCHEDULES	
			HOLIDAY SCHEDULE 01	
HD.01	MON	XX	Holiday Start Month	
	DAY	XX	Start Day	
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 02	
HD.02	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 03	
HD.03	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 04	
HD.04	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 05	
HD.05	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 06	
HD.06	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 07	
HD.07	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 08	
HD.08	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	

Time Clock Mode and Sub-Mode Directory (cont)

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
			HOLIDAY SCHEDULE 09	
HD.09	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 10	
HD.10	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 11	
HD.11	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 12	
HD.12	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 13	
HD.13	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 14	
HD.14	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 15	
HD.15	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 16	
HD.16	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 17	
HD.17	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 18	
HD.18	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
			HOLIDAY SCHEDULE 19	
HD.19	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
		HOLIDAY SCHEDULE 20		
HD.20	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
		HOLIDAY SCHEDULE 21		
HD.21	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
		HOLIDAY SCHEDULE 22		
HD.22	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
		HOLIDAY SCHEDULE 23		
HD.23	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
		HOLIDAY SCHEDULE 24		
HD.24	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
		HOLIDAY SCHEDULE 25		
HD.25	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
		HOLIDAY SCHEDULE 26		
HD.26	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
		HOLIDAY SCHEDULE 27		
HD.27	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
		HOLIDAY SCHEDULE 28		
HD.28	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
		HOLIDAY SCHEDULE 29		
HD.29	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	
		HOLIDAY SCHEDULE 30		
HD.30	MON	XX	Holiday Start Month	1 - 12 (1 = January, 2 = February, etc.)
	DAY	XX	Start Day	01-31
	LEN	XX	Duration (days)	

Time Clock Mode and Sub-Mode Directory (cont)

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
SCH.N			Schedule Number 0	
SCH.L	LOCAL OCCUPANCY SCHEDULE			
	OCCUPANCY PERIOD 1			
	OCC.1	XX:XX	Period Occupied Time	Military (00:00 - 23:59)
	UNC.1	XX:XX	Period Unoccupied Time	Military (00:00 - 23:59)
	MON.1	YES/NO	Monday In Period	
	TUE.1	YES/NO	Tuesday In Period	
PER.1	WED.1	YES/NO	Wednesday In Period	
	THU.1	YES/NO	Thursday In Period	
	FRI.1	YES/NO	Friday In Period	
	SAT.1	YES/NO	Saturday In Period	
	SUN.1	YES/NO	Sunday In Period	
	HOL.1	YES/NO	Holiday In Period	
	OCCUPANCY PERIOD 2			
	OCC.2	XX:XX	Period Occupied Time	Military (00:00 - 23:59)
	UNC.2	XX:XX	Period Unoccupied Time	Military (00:00 - 23:59)
	MON.2	YES/NO	Monday In Period	
	TUE.2	YES/NO	Tuesday In Period	
PER.2	WED.2	YES/NO	Wednesday In Period	
	THU.2	YES/NO	Thursday In Period	
	FRI.2	YES/NO	Friday In Period	
	SAT.2	YES/NO	Saturday In Period	
	SUN.2	YES/NO	Sunday In Period	
	HOL.2	YES/NO	Holiday In Period	
	OCCUPANCY PERIOD 3			
	OCC.3	XX:XX	Period Occupied Time	Military (00:00 - 23:59)
	UNC.3	XX:XX	Period Unoccupied Time	Military (00:00 - 23:59)
	MON.3	YES/NO	Monday In Period	
	TUE.3	YES/NO	Tuesday In Period	
PER.3	WED.3	YES/NO	Wednesday In Period	
	THU.3	YES/NO	Thursday In Period	
	FRI.3	YES/NO	Friday In Period	
	SAT.3	YES/NO	Saturday In Period	
	SUN.3	YES/NO	Sunday In Period	
	HOL.3	YES/NO	Holiday In Period	
	OCCUPANCY PERIOD 4			
	OCC.4	XX:XX	Period Occupied Time	Military (00:00 - 23:59)
	UNC.4	XX:XX	Period Unoccupied Time	Military (00:00 - 23:59)
	MON.4	YES/NO	Monday In Period	
	TUE.4	YES/NO	Tuesday In Period	
PER.4	WED.4	YES/NO	Wednesday In Period	
	THU.4	YES/NO	Thursday In Period	
	FRI.4	YES/NO	Friday In Period	
	SAT.4	YES/NO	Saturday In Period	
	SUN.4	YES/NO	Sunday In Period	
	HOL.4	YES/NO	Holiday In Period	
	OCCUPANCY PERIOD 5			
	OCC.5	XX:XX	Period Occupied Time	Military (00:00 - 23:59)
	UNC.5	XX:XX	Period Unoccupied Time	Military (00:00 - 23:59)
	MON.5	YES/NO	Monday In Period	
	TUE.5	YES/NO	Tuesday In Period	
PER.5	WED.5	YES/NO	Wednesday In Period	
	THU.5	YES/NO	Thursday In Period	
	FRI.5	YES/NO	Friday In Period	
	SAT.5	YES/NO	Saturday In Period	
	SUN.5	YES/NO	Sunday In Period	
	HOL.5	YES/NO	Holiday In Period	

Time Clock Mode and Sub-Mode Directory (cont)

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
			OCCUPANCY PERIOD 6	
	OCC.6	XX:XX	Period Occupied Time	Military (00:00 - 23:59)
	UNC.6	XX:XX	Period Unoccupied Time	Military (00:00 - 23:59)
	MON.6	YES/NO	Monday In Period	
	TUE.6	YES/NO	Tuesday In Period	
PER.6	WED.6	YES/NO	Wednesday In Period	
	THU.6	YES/NO	Thursday In Period	
	FRI.6	YES/NO	Friday In Period	
	SAT.6	YES/NO	Saturday In Period	
	SUN.6	YES/NO	Sunday In Period	
	HOL.6	YES/NO	Holiday In Period	
			OCCUPANCY PERIOD 7	
	OCC.7	XX:XX	Period Occupied Time	Military (00:00 - 23:59)
	UNC.7	XX:XX	Period Unoccupied Time	Military (00:00 - 23:59)
	MON.7	YES/NO	Monday In Period	
	TUE.7	YES/NO	Tuesday In Period	
PER.7	WED.7	YES/NO	Wednesday In Period	
	THU.7	YES/NO	Thursday In Period	
	FRI.7	YES/NO	Friday In Period	
	SAT.7	YES/NO	Saturday In Period	
	SUN.7	YES/NO	Sunday In Period	
	HOL.7	YES/NO	Holiday In Period	
			OCCUPANCY PERIOD 8	
	OCC.8	XX:XX	Period Occupied Time	Military (00:00 - 23:59)
	UNC.8	XX:XX	Period Unoccupied Time	Military (00:00 - 23:59)
	MON.8	YES/NO	Monday In Period	
	TUE.8	YES/NO	Tuesday In Period	
PER.8	WED.8	YES/NO	Wednesday In Period	
	THU.8	YES/NO	Thursday In Period	
	FRI.8	YES/NO	Friday In Period	
	SAT.8	YES/NO	Saturday In Period	
	SUN.8	YES/NO	Sunday In Period	
	HOL.8	YES/NO	Holiday In Period	
			SCHEDULE OVERRIDE	
OVR	OVR.T	X	Timed Override Hours	Default: 0 Range 0-4 hours
	OVR.L	X	Override Time Limit	Default: 0 Range 0-4 hours
	T.OVR	YES/NO	Timed Override	User Entry

APPENDIX A — DISPLAY TABLES (cont)

Operating Mode and Sub-Mode Directory

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
			MODES CONTROLLING UNIT	
MODE	MD01	ON/OFF	CSM Controlling Chiller	
	MD02	ON/OFF	WSM Controlling Chiller	
	MD03	ON/OFF	Master/Slave Control	
	MD05	ON/OFF	Ramp Load Limited	
	MD06	ON/OFF	Timed Override in effect	
	MD07	ON/OFF	Low Cooler Suction TempA	
	MD08	ON/OFF	Low Cooler Suction TempB	
	MD09	ON/OFF	Slow Change Override	
	MD10	ON/OFF	Minimum OFF time active	
	MD13	ON/OFF	Dual Set Point	
	MD14	ON/OFF	Temperature Reset	
	MD15	ON/OFF	Demand Limited	
	MD16	ON/OFF	Cooler Freeze Protection	
	MD17	ON/OFF	Low Temperature Cooling	
	MD18	ON/OFF	High Temperature Cooling	
	MD19	ON/OFF	Making Ice	
	MD20	ON/OFF	Storing Ice	
	MD21	ON/OFF	High SCT Circuit A	
	MD22	ON/OFF	High SCT Circuit B	
	MD23	ON/OFF	Minimum Comp. On Time	
	MD24	ON/OFF	Pump Off Delay Time	
	MD25	ON/OFF	Low Sound Mode	

Alarms Mode and Sub-Mode Directory

SUB-MODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
			CURRENTLY ACTIVE ALARMS	
CRNT	AXXX TXXX PXXX		Current Alarms 1-25	Alarms are hown as AXXX Alerts are shown as TXXX
RCRN	YES/NO		Reset All Current Alarms	
			ALARM HISTORY	
HIST	AXXX TXXX PXXX		Alarm History 1-20	Alarms are shown as AXXX Alerts are shown as TXXX

APPENDIX B — CCN TABLES

CCN DISPLAY TABLES — A_UNIT (General Unit Parameters)

DESCRIPTION	VALUE	UNITS	POINT NAME	FORCIBLE
Control Mode	0 = Test 1 = Local Off 2 = CCN Off 3 = Clock Off 4 = Emergency Stop 5 = Local On 6 = CCN On 7 = Clock On 8 = Heat Enabled 9 = Pump Delay		STAT	N
Occupied	No/Yes		OCC	N
CCN Chiller	Start/Stop		CHIL_S_S	Y
Low Sound Active	No/Yes		LSACTIVE	N
Alarm State	Normal/Alert/Alarm		ALM	N
Active Demand Limit	0 to 100	%	DEM_LIM	Y
Override Modes in Effect	No/Yes		MODE	N
Percent Total Capacity	0 to 100	%	CAP_T	N
Requested Stage	0 to 99		STAGE	N
Active Set Point	–20 to 70	°F	SP	N
Control Point	–20 to 70	°F	CTRL_PNT	Y
Entering Fluid Temp	snnn.n	°F	EWT	N
Leaving Fluid Temp	snnn.n	°F	LWT	N
Emergency Stop	Enable/Emstop	Enable	EMSTOP	Y
Minutes Left for Start	00:00 to 15:00	minutes	MIN_LEFT	N
PUMPS				
Cooler Pump Relay 1	Off/On		COOLPMP1	N
Cooler Pump Relay 2	Off/On		COOLPMP2	N
Cooler Pump 1 Interlock	Open/Close		PMP1_FBK	N
Cooler Pump 2 Interlock	Open/Close		PMP2_FBK	N
Cooler Flow Switch	Open/Close		COOLFLOW	N
Lead Pump			LEADPUMP	Y
Rotate Cooler Pumps Now	No/Yes		ROT_PUMP	Y
Heat/Cool Select	Heat/Cool		HC_SEL	N

CCN DISPLAY TABLES — CIRCA_AN (Circuit A Analog Parameters)

DESCRIPTION	VALUE	UNITS	POINT NAME	FORCIBLE
CIRCUIT A ANALOG VALUES				
Percent Total Capacity	0-100	%	CAPA_T	N
Percent Available Cap.	0-100	%	CAPA_A	N
Discharge Pressure	nnn.n	PSIG	DP_A	N
Suction Pressure	nnn.n	PSIG	SP_A	N
Head Setpoint	nnn.n	°F	HSP	N
Saturated Condensing Tmp	snnn.n	°F	TMP_SCTA	N
Saturated Suction Temp	snnn.n	°F	TMP_SSTA	N
EXV % Open	nnn	%	EXV_A	N
Var Head Press Output	nnn.n	milliamps	VHP_ACT	N
Compr Return Gas Temp	nnn.n	°F	TMP_RGTA	N
Discharge Gas Temp	nnn.n	°F	DISGAS	N
Suction Superheat Temp	nnn.n	ΔF	SH_A	N
Spare 1 Temperature	nnn.n	°F	SPR1_TMP	N

APPENDIX B — CCN TABLES (cont)

CCN DISPLAY TABLES — CIRCADIO (Circuit A Discrete Inputs/Outputs)

DESCRIPTION	VALUE	UNITS	POINT NAME	FORCIBLE
CIRC. A DISCRETE OUTPUTS				
Compressor A1 Relay	On/Off		K_A1_RLY	N
Compressor A2 Relay	On/Off		K_A2_RLY	N
Minimum Load Valve Relay	On/Off		MLV_RLY	N
CIRC. A DISCRETE INPUTS				
Compressor A1 Feedback	On/Off		K_A1_FBK	N
Compressor A2 Feedback	On/Off		K_A2_FBK	N

CCN DISPLAY TABLES — CIRCB_AN (Circuit B Analog Parameters)

DESCRIPTION	VALUE	UNITS	POINT NAME	FORCIBLE
CIRCUIT B ANALOG VALUES				
Percent Total Capacity	0-100	%	CAPB_T	N
Percent Available Cap.	0-100	%	CAPB_A	N
Discharge Pressure	nnn.n	PSIG	DP_B	N
Suction Pressure	nnn.n	PSIG	SP_B	N
Head Setpoint	nnn.n	°F	HSP	N
Saturated Condensing Tmp	snnn.n	°F	TMP_SCTB	N
Saturated Suction Temp	snnn.n	°F	TMP_SSTB	N
EXV % Open	nnn	%	EXV_B	N
Var Head Press Output	nnn.n	milliamps	VHP_ACT	N
Compr Return Gas Temp	nnn.n	°F	TMP_RGTB	N
Suction Superheat Temp	nnn.n	ΔF	SH_B	N
Spare 2 Temperature	nnn.n	°F	SPR2_TMP	N

CCN DISPLAY TABLES — CIRCBDIO (Circuit B Discrete Inputs/Outputs)

DESCRIPTION	VALUE	UNITS	POINT NAME	FORCIBLE
CIRC. B DISCRETE OUTPUTS				
Compressor B1 Relay	On/Off		K_B1_RLY	N
Compressor B2 Relay	On/Off		K_B2_RLY	N
Minimum Load Valve Relay	On/Off		MLV_RLY	N
CIRC. B DISCRETE INPUTS				
Compressor B1 Feedback	On/Off		K_B1_FBK	N
Compressor B2 Feedback	On/Off		K_B2_FBK	N

CCN DISPLAY TABLES — OPTIONS (Unit Parameters)

DESCRIPTION	VALUE	UNITS	POINT NAME	FORCIBLE
FANS				
Fan 1 Relay	Off/On		FAN_1	N
Fan 2 Relay	Off/On		FAN_2	N
Cooler/Pump Heater	Off/On		COOL_HTR	N
UNIT ANALOG VALUES				
Cooler Entering Fluid	snnn.n	°F	COOL_EWT	N
Cooler Leaving Fluid	snnn.n	°F	COOL_LWT	N
Lead/Lag Leaving Fluid	snnn.n	°F	DUAL_LWT	N
TEMPERATURE RESET				
4-20 mA Reset Signal	nn.n	mA	RST_MA	N
Outside Air Temperature	snnn.n	°F	OAT	Y
Space Temperature	snnn.n	°F	SPT	Y
DEMAND LIMIT				
4-20 mA Demand Signal	nn.n	mA	LMT_MA	N
Demand Limit Switch 1	Off/On		DMD_SW1	N
Demand Limit Switch 2	Off/On		DMD_SW2	N
CCN Loadshed Signal	0 = Normal 1 = Redline 2 = Loadshed		DL_STAT	N
MISCELLANEOUS				
Heat Request	Off/On		HEAT_REQ	N
Dual Setpoint Switch	Off/On		DUAL_IN	N
Cooler LWT Setpoint	snnn.n	°F	LWT_SP	N
Ice Done	Off/On		ICE_DONE	N

CCN CONFIGURATION TABLES — UNIT (Unit Configuration)

DESCRIPTION	VALUE	DEFAULT	UNITS	POINT NAME
Unit Size	nnn		tons	SIZE
Compressor A1 Size	nnn		tons	SIZE_A1
Compressor A2 Size	nnn		tons	SIZE_A2
Compressor B1 Size	nnn		tons	SIZE_B1
Compressor B2 Size	nnn		tons	SIZE_B2
Suction Superheat Setpt	nn.n	9.0	ΔF	SH_SP
Number of Fans	n			FAN_TYPE
Compressor A1 Digital?	No/Yes	No		CPA1TYPE
Maximum A1 Unload Time	nn	12	sec	MAXULTME

CCN CONFIGURATION TABLES — OPTIONS1 (Options 1 Configuration)

DESCRIPTION	VALUE	DEFAULT	UNITS	POINT NAME
Cooler Fluid	1 = Water 2 = Med. Brine	1		FLUIDTYP
Minimum Load Vlv Select	No/Yes	No		MLV_FLG
CSB Board Enable	Dsable/Enable	Enable		CSB_ENA
Cooler Pump Control	Off/On	Off		CPC
Cooler Pump 1 Enable	No/Yes	No		PMP1_ENA
Cooler Pump 2 Enable	No/Yes	No		PMP2_ENA
Cooler Pmp Periodic Strt	No/Yes	No		PUMP_PST
Cooler Pump Select	0 = Automatic, 1 = Pump 1, 2 = Pump 2	0		PMP_SLCT
Cooler Pump Shutdown Dly	0 to 10	1	minutes	PUMP_DLY
Pump Changeover Hours	10 to 2000	100	hours	PMP_DLTA
EMM Module Installed	No/Yes	No		EMM_BRD
Cnd HX Typ: 0=RTPF 1=MCHX	0/1	1		COILTYPE
EXV MOP Set Point	nn.n		°F	MOP_SP
Config Approach Setpoint	nn.n		°F	IAPPROSP

CCN CONFIGURATION TABLES — OPTIONS2 (Options 2 Configuration)

DESCRIPTION	VALUE	DEFAULT	UNITS	POINT NAME
Control Method	0 = Switch 2 = Occupancy 3 = CCN	0		CONTROL
Loading Sequence Select	1 = Equal Loading 2 = Staged Loading	1		SEQ_TYP
Lead/Lag Circuit Select	1 = Automatic 2 = Circuit A Leads 3 = Circuit B Leads	1		LEAD_TYP
Cooling Setpoint Select	0 = Single 1 = Dual, remote switch controlled 2 = Dual CCN occupancy 3 = 4-20 mA input	0		CLSP_TYP
Ramp Load Select	Enable/Dsable	Enable		RAMP_EBL
Heat Cool Select	Cool/Heat	Cool		HEATCOOL
High LCW Alert Limit	2 to 60	60.0	ΔF	LCW_LMT
Minutes off time	0 to 15	0	min	DELAY
Deadband Multiplier	1.0 to 4.0	1.0		Z_GAIN
Ice Mode Enable	Enable/Dsable	Dsable		ICE_CNFG
Low Sound Mode Select	0 = Disabled 1 = Fan only 2 = Capacity/Fans	0		LS_MODE
Low Sound Start Time	00:00 to 23:59	00:00		LS_START
Low Sound End Time	00:00 to 23:59	00:00		LS_END
Low Sound Capacity Limit	0 to 100	100	%	LS_LIMIT

CCN CONFIGURATION TABLES — SCHEDOVR (Timed Override Setup)

DESCRIPTION	VALUE	DEFAULT	UNITS	POINT NAME
Schedule Number	0 to 99	1		SCHEDNUM
Override Time Limit	0 to 4	0	hours	OTL
Timed Override Hours	0 to 4	0	hours	OVR_EXT
Timed Override	No/Yes	No		TIMEOVER

CCN CONFIGURATION TABLES — RESETCON (Temperature Reset and Demand Limit)

DESCRIPTION	VALUE	DEFAULT	UNITS	POINT NAME
COOLING RESET				
Cooling Reset Type	0 = No Reset 1 = 4-20 mA input 2 = External temp – OAT 3 = Return Fluid 4 = External temp - SPT	0		CRST_TYP
4-20 MA RESET				
4-20 – Degrees Reset	–30 to 30	0.0	ΔF	420_DEG
REMOTE RESET				
Remote – No Reset Temp	0 to 125	125.0	°F	REM_NO
Remote – Full Reset Temp	0 to 125	0.0	°F	REM_FULL
Remote – Degrees Reset	–30 to 30	0.0	ΔF	REM_DEG
RETURN TEMPERATURE RESET				
Return – No Reset Temp	0 to 125	10.0	ΔF	RTN_NO
Return – Full Reset Temp	0 to 125	0.0	ΔF	RTN_FULL
Return – Degrees Reset	–30 to 30	0.0	ΔF	RTN_DEG
DEMAND LIMIT				
Demand Limit Select	0 = None 1 = External switch input 2 = 4-20 mA input 3 = Loadshed	0		DMD_CTRL
Demand Limit at 20 mA	0 to 100	100	%	DMT20MA
Loadshed Group Number	0 to 99	0		SHED_NUM
Loadshed Demand Delta	0 to 60	0	%	SHED_DEL
Maximum Loadshed Time	0 to 120	60	minutes	SHED_TIM
Demand Limit Switch 1	0 to 100	80	%	DLSWSP1
Demand Limit Switch 2	0 to 100	50	%	DLSWSP2

APPENDIX B — CCN TABLES (cont)

CCN CONFIGURATION TABLES — DUALCHIL (Dual Chiller Configuration Settings)

DESCRIPTION	VALUE	DEFAULT	UNITS	POINT NAME
LEAD/LAG				
Lead/Lag Chiller Enable	Enable/Dsable	Dsable		LL_ENA
Master/Slave Select	Master/Slave	Master		MS_SEL
Slave Address	0 to 239	2		SLV_ADDR
Lead/Lag Balance Select	0 = None	0		LL_BAL
Lead/Lag Balance Delta	40 to 400	168	hours	LL_BAL_D
Lag Start Delay	0 to 30	5	minutes	LL_DELAY
Parallel Configuration	Yes	Yes		PARALLEL

CCN CONFIGURATION TABLES — DISPLAY (Marquee Display SETUP)

DESCRIPTION	VALUE	DEFAULT	UNITS	POINT NAME
Service Password	nnnn	1111		PASSWORD
Password Enable	Enable/Disable	Enable		PASS_EBL
Metric Display	Off/On	Off		DISPUNIT
Language Selection	0 = ENGLISH 1 = FRANCAIS 2 = ESPANOL 3 = PORTUGUES	0		LANGUAGE

CCN CONFIGURATION TABLES — EXVACONF (EXV Circuit A Configuration)

DESCRIPTION	VALUE	DEFAULT	UNITS	POINT NAME
EXV Circ. A Start Pos	nnn.n	50.0	%	EXVASTRT
EXV Circ. A Min Position	nnn.n	8.0	%	EXVAMINP
EXVA Steps in Range	nnnnn	1596/2500	steps	EVXARANG
EXVA Steps Per Second	nnnnn	200	steps	EXVARATE
EXVA Fail Position in %	nnnn.nn	0	%	EXVAPOSF
EXVA Minimum Steps	nnnnn	0	steps	EXVAMINS
EXVA Maximum Steps	nnnnn	1596/2500	steps	EXVAMAXS
EXVA Overrun Steps	nnnnn	167	steps	EXVAOVRS
EXVA Stepper Type	nnn	Bipolar		EXVATYPE
High SCT Threshold	nnn.n	115	°F	HIGH_SCT
Open EXV X% on 2nd Comp	nnn.n	10	%	EXV_HSCT
Open EXV X% on DISCRSOL	nnn.n	5	%	EXVDISCR
Pre-Open EXV - Fan Adding	nnn.n	10	%	EXV_AFAN
Pre-Close EXV - Fan Sub	nnn.n	10	%	EXV_MFAN
Pre-Close EXV - Lag Shut	nnn.n	10	%	EXV_SLAG
Lag Start Delay	nnn	10	secs	DELAYLAG

CCN CONFIGURATION TABLES — EXVBCONF (EXV Circuit B Configuration)

DESCRIPTION	VALUE	DEFAULT	UNITS	POINT NAME
EXV Circ. B Start Pos	nnn.n	50.0	%	EXVBSTRT
EXV Circ. B Min Position	nnn.n	8.0	%	EXVBMINP
EXVB Steps in Range	nnnnn	1596/2500	steps	EVXBRANG
EXVB Steps Per Second	nnnnn	200	steps	EXVBRATE
EXVB Fail Position in %	nnnn.nn	0	%	EXVBPOSF
EXVB Minimum Steps	nnnnn	0	steps	EXVBMINS
EXVB Maximum Steps	nnnnn	1596/2500	steps	EXVBMAXS
EXVB Overrun Steps	nnnnn	167	steps	EXVBOVRS
EXVB Stepper Type	nnn	Bipolar		EXVBTYPE

CCN CONFIGURATION TABLES — MM_CONF (Motormaster Configuration)

DESCRIPTION	VALUE	DEFAULT	UNITS	POINT NAME
Motormaster Select	No/Yes	No		MM_SLCT
Head Pressure P Gain	nnn.n	1.0		HP_PGAIN
Head Pressure I Gain	nnn.n	0.1		HP_IGAIN
Head Pressure D Gain	nnn.n	0.0		HP_DGAIN
Minimum Fan Speed	nnn.n	5.0	%	MIN_VHP

APPENDIX B — CCN TABLES (cont)

CCN SERVICE TABLES — SERVICE

DESCRIPTION	VALUE	DEFAULT	UNITS	POINT NAME
SERVICE				
Brine Freeze Point	nnn.n		°F	BRN_FRZ
Pump Service Interval	nnnnn		hours	SI_PUMPS
COMPRESSOR ENABLE				
Enable Compressor A1	Disable/Enable			ENABLEA1
Enable Compressor A2	Disable/Enable			ENABLEA2
Enable Compressor B1	Disable/Enable			ENABLEB1
Enable Compressor B2	Disable/Enable			ENABLEB2

CCN SETPOINT TABLES — SETPOINT

DESCRIPTION	VALUE	DEFAULT	UNITS	POINT NAME
COOLING				
Cooling Setpoint 1	−20 to 70	44.0	°F	CSP1
Cooling Setpoint 2	−20 to 70	44.0	°F	CSP2
ICE Setpoint	−20 to 32	32.0	°F	CSP3
RAMP LOADING				
Cooling Ramp Loading	0.2 to 2.0	1.0		CRAMP
Brine Freeze Point	−20 to 34	34.0	°F	BRN_FRZ
Head Setpoint			°F	HSP
Fan On Set Point			°F	FANONSP
Fan Off Set Point			°F	FANOFFSP
Fan Stage Delta			°F	FSTGDLTA
Base Fan Off Delta Temp			°F	B_FANOFF

CCN MAINTENANCE TABLES — CIRA_EXV

DESCRIPTION	VALUE	DEFAULT	UNITS	POINT NAME
EXV % Open	nnn		%	EXV_A
Circuit A Approach	nnn.n		delta F	CIRA_APP
Approach Setpoint	nnn.n		delta F	APPRA_SP
EXVA Override	nnnnn			EXVAOVRR
Suction Superheat Temp	nnn.n		delta F	SH_A
Active Superheat Setpt	nn.n		delta F	ACTSH_SP
Active MOP Setpt	nn.n		delta F	ACMOP_SP
Cir A EXV Position Limit	nnn		%	PLMA

CCN MAINTENANCE TABLES — CIRB_EXV

DESCRIPTION	VALUE	DEFAULT	UNITS	POINT NAME
EXV % Open	nnn		%	EXV_B
Circuit B Approach	nnn.n		delta F	CIRB_APP
Approach Setpoint	nnn.n		delta F	APPRB_SP
EXVB Override	nnnnn			EXVBOVRR
Suction Superheat Temp	nnn.n		delta F	SH_B
Active Superheat Setpt	nn.n		delta F	ACTSH_SP
Active MOP Setpt	nn.n		delta F	ACMOP_SP
Cir B EXV Position Limit	nnn		%	PLMB

CCN MAINTENANCE TABLES — STRTHOUR

DESCRIPTION	VALUE	UNITS	POINT NAME
Machine Operating Hours	nnnnnn	hours	HR_MACH
Machine Starts	nnnnnn		CY_MACH
Circuit A Run Hours	nnnnnn	hours	HR_CIRA
Compressor A1 Run Hours	nnnnnn	hours	HR_A1
Compressor A2 Run Hours	nnnnnn	hours	HR_A2
Circuit B Run Hours	nnnnnn	hours	HR_CIRB
Compressor B1 Run Hours	nnnnnn	hours	HR_B1
Compressor B2 Run Hours	nnnnnn	hours	HR_B2
Circuit A Starts	nnnnnn		CY_CIRA
Compressor A1 Starts	nnnnnn		CY_A1
Compressor A2 Starts	nnnnnn		CY_A2
Circuit B Starts	nnnnnn		CY_CIRB
Compressor B1 Starts	nnnnnn		CY_B1
Compressor B2 Starts	nnnnnn		CY_B2
PUMP HOURS			
Pump 1 Run Hours	nnnnnn	hours	HR_PUMP1
Pump 2 Run Hours	nnnnnn	hours	HR_PUMP2

CCN MAINTENANCE TABLES — CURRMODS

DESCRIPTION	VALUE	POINT NAME
CSM controlling Chiller	On/Off	MODE_1
WSM controlling Chiller	On/Off	MODE_2
Master/Slave control	On/Off	MODE_3
Ramp Load Limited	On/Off	MODE_5
Timed Override in effect	On/Off	MODE_6
Low Cooler Suction TempA	On/Off	MODE_7
Low Cooler Suction TempB	On/Off	MODE_8
Slow Change Override	On/Off	MODE_9
Minimum OFF time active	On/Off	MODE_10
Dual Setpoint	On/Off	MODE_13
Temperature Reset	On/Off	MODE_14
Demand/Sound Limited	On/Off	MODE_15
Cooler Freeze Protection	On/Off	MODE_16
Low Temperature Cooling	On/Off	MODE_17
High Temperature Cooling	On/Off	MODE_18
Making ICE	On/Off	MODE_19
Storing ICE	On/Off	MODE_20
High SCT Circuit A	On/Off	MODE_21
High SCT Circuit B	On/Off	MODE_22
Minimum Comp. On Time	On/Off	MODE_23
Pump Off Delay Time	On/Off	MODE_24
Low Sound Mode	On/Off	MODE_25

APPENDIX B — CCN TABLES (cont)

CCN MAINTENANCE TABLES — ALARMS

DESCRIPTION	VALUE	POINT NAME
Active Alarm #1	Axxx or Txxx	ALARM01C
Active Alarm #2	Axxx or Txxx	ALARM02C
Active Alarm #3	Axxx or Txxx	ALARM03C
Active Alarm #4	Axxx or Txxx	ALARM04C
Active Alarm #5	Axxx or Txxx	ALARM05C
Active Alarm #6	Axxx or Txxx	ALARM06C
Active Alarm #7	Axxx or Txxx	ALARM07C
Active Alarm #8	Axxx or Txxx	ALARM08C
Active Alarm #9	Axxx or Txxx	ALARM09C
Active Alarm #10	Axxx or Txxx	ALARM10C
Active Alarm #11	Axxx or Txxx	ALARM11C
Active Alarm #12	Axxx or Txxx	ALARM12C
Active Alarm #13	Axxx or Txxx	ALARM13C
Active Alarm #14	Axxx or Txxx	ALARM14C
Active Alarm #15	Axxx or Txxx	ALARM15C
Active Alarm #16	Axxx or Txxx	ALARM16C
Active Alarm #17	Axxx or Txxx	ALARM17C
Active Alarm #18	Axxx or Txxx	ALARM18C
Active Alarm #19	Axxx or Txxx	ALARM19C
Active Alarm #20	Axxx or Txxx	ALARM20C
Active Alarm #21	Axxx or Txxx	ALARM21C
Active Alarm #22	Axxx or Txxx	ALARM22C
Active Alarm #23	Axxx or Txxx	ALARM23C
Active Alarm #24	Axxx or Txxx	ALARM24C
Active Alarm #25	Axxx or Txxx	ALARM25C

CCN MAINTENANCE TABLES — VERSIONS

DESCRIPTION	VERSION	VALUE
EXV	CESR131172-	nn-nn
AUX	CESR131333-	nn-nn
MBB	CESR131460-	nn-nn
EMM	CESR131174-	nn-nn
MARQUEE	CESR131171-	nn-nn
NAVIGATOR	CESR130227-	nn-nn

CCN MAINTENANCE TABLES — LOADFACT

DESCRIPTION	VALUE	UNITS	POINT NAME
CAPACITY CONTROL			
Load/Unload Factor	snnn.n		SMZ
Control Point	snnn.n	°F	CTRL_PNT
Entering Fluid Temp	snnn.n	°F	EWT
Leaving Fluid Temp	snnn.n	°F	LWT
Ramp Load Limited	On/Off		MODE_5
Slow Change Override	On/Off		MODE_9
Cooler Freeze Protection	On/Off		MODE_16
Low Temperature Cooling	On/Off		MODE_17
High Temperature Cooling	On/Off		MODE_18
Minimum Comp. On Time	On/Off		MODE_23

APPENDIX B — CCN TABLES (cont)

CCN MAINTENANCE TABLES — PM-PUMP

DESCRIPTION	VALUE	UNITS	POINT NAME
Pump Service Interval	nnnnnn	hours	SI_PUMPS
Pump 1 Service Countdown	nnnnnn	hours	P1_CDOWN
Pump 1 Maintenance Done	Yes/No		P1_MAINT
Pump 2 Service Countdown	nnnnnn	hours	P2_CDOWN
Pump 2 Maintenance Done	Yes/No		P2_MAINT
Pump 1 Maintenance Date	mm/dd/yy hh:mm		PMP1_PM0
Pump 1 Maintenance Date	mm/dd/yy hh:mm		PMP1_PM1
Pump 1 Maintenance Date	mm/dd/yy hh:mm		PMP1_PM2
Pump 1 Maintenance Date	mm/dd/yy hh:mm		PMP1_PM3
Pump 1 Maintenance Date	mm/dd/yy hh:mm		PMP1_PM4
Pump 2 Maintenance Date	mm/dd/yy hh:mm		PMP2_PM0
Pump 2 Maintenance Date	mm/dd/yy hh:mm		PMP2_PM1
Pump 2 Maintenance Date	mm/dd/yy hh:mm		PMP2_PM2
Pump 2 Maintenance Date	mm/dd/yy hh:mm		PMP2_PM3
Pump 2 Maintenance Date	mm/dd/yy hh:mm		PMP2_PM4

CCN MAINTENANCE TABLES — PM-STRN

DESCRIPTION	VALUE	UNITS	POINT NAME
Strainer Srvc Interval	nnnnnn	hours	SI_STRNR
Strainer Srvc Countdown	nnnnnn	hours	ST_CDOWN
Strainer Maint. Done	Yes/No		ST_MAINT
Strainer Maint. Date	mm/dd/yy hh:mm		STRN_PM0
Strainer Maint. Date	mm/dd/yy hh:mm		STRN_PM1
Strainer Maint. Date	mm/dd/yy hh:mm		STRN_PM2
Strainer Maint. Date	mm/dd/yy hh:mm		STRN_PM3
Strainer Maint. Date	mm/dd/yy hh:mm		STRN_PM4

CCN MAINTENANCE TABLES — PM-COIL

DESCRIPTION	VALUE	UNITS	POINT NAME
Coil Cleaning Srvc Inter	nnnnnn	hours	SI_COIL
Coil Service Countdown	nnnnnn	hours	CL_CDOWN
Coil Cleaning Maint.Done	Yes/No		CL_MAINT
Coil Cleaning Maint.Date	mm/dd/yy hh:mm		COIL_PM0
Coil Cleaning Maint.Date	mm/dd/yy hh:mm		COIL_PM1
Coil Cleaning Maint.Date	mm/dd/yy hh:mm		COIL_PM2
Coil Cleaning Maint.Date	mm/dd/yy hh:mm		COIL_PM3
Coil Cleaning Maint.Date	mm/dd/yy hh:mm		COIL_PM4

CCN MAINTENANCE TABLES — TESTMODE

DESCRIPTION	VALUE	UNITS	POINT NAME
Service Test Mode	On/Off		NET_CTRL
Compressor A1 Relay	On/Off		S_A1_RLY
Compressor A2 Relay	On/Off		S_A2_RLY
Compressor B1 Relay	On/Off		S_B1_RLY
Compressor B2 Relay	On/Off		S_B2_RLY
Fan 1 Relay	On/Off		S_FAN_1
Fan 2 Relay	On/Off		S_FAN_2
Cooler Pump Relay 1	On/Off		S_CLPMP1
Cooler Pump Relay 2	On/Off		S_CLPMP2
Comp A1 Unload Time	nn	sec	S_A1ULTM
Minimum Load Valve Relay	On/Off		S_MLV
Remote Alarm Relay	On/Off		S_ALM
EXV % Open	nn	%	S_EXV_A
EXV % Open	nn	%	S_EXV_B

CCN MAINTENANCE TABLES — RUNTEST

DESCRIPTION	VALUE	UNITS	POINT NAME
Percent Total Capacity	nnn	%	CAPA_T
Percent Available Cap.	nnn	%	CAPA_A
Discharge Pressure	nnn.n	psig	DP_A
Suction Pressure	nnn.n	psig	SP_A
Head Setpoint	nnn.n	°F	HSP
Saturated Condensing Tmp	nnn.n	°F	TMP_SCTA
Saturated Suction Temp	nnn.n	°F	TMP_SSTA
Compr Return Gas Temp	nnn.n	°F	TMP_RGTA
Discharge Gas Temp	nnn.n	°F	DISGAS
Suction Superheat Temp	nnn.n	^F	SH_A
Compressor A1 Relay	On/Off		K_A1_RLY
Compressor A2 Relay	On/Off		K_A2_RLY
Minimum Load Valve Relay	On/Off		MLV_RLY
Compressor A1 Feedback	On/Off		K_A1_FBK
Compressor A2 Feedback	On/Off		K_A2_FBK
Percent Total Capacity	nnn	%	CAPB_T
Percent Available Cap.	nnn	%	CAPB_A
Discharge Pressure	nnn.n	psig	DP_B
Suction Pressure	nnn.n	psig	SP_B
Head Setpoint	nnn.n	°F	HSP
Saturated Condensing Tmp	nnn.n	°F	TMP_SCTB
Saturated Suction Temp	nnn.n	°F	TMP_SSTB
Compr Return Gas Temp	nnn.n	°F	TMP_RGTB
Suction Superheat Temp	nnn.n	^F	SH_B
Compressor B1 Relay	On/Off		K_B1_RLY
Compressor B2 Relay	On/Off		K_B2_RLY
Minimum Load Valve Relay	On/Off		MLV_RLY
Compressor B1 Feedback	On/Off		K_B1_FBK
Compressor B2 Feedback	On/Off		K_B2_FBK
Fan 1 Relay	On/Off		FAN_1
Fan 2 Relay	On/Off		FAN_2
Outside Air Temperature	nnn.n	°F	OAT
Space Temperature	nnn.n	°F	SPT
Cooler Pump Relay 1	On/Off		COOLPMP1
Cooler Pump Relay 2	On/Off		COOLPMP2
Cooler Pump 1 Interlock	Open/Closed		PMP1_FBK
Cooler Pump 2 Interlock	Open/Closed		PMP2_FBK
Cooler Entering Fluid	nnn.n	°F	COOL_EWT
Cooler Leaving Fluid	nnn.n	°F	COOL_LWT
Compressor A1 Size	nnn	tons	SIZE_A1
Compressor A2 Size	nnn	tons	SIZE_A2
Compressor B1 Size	nnn	tons	SIZE_B1
Compressor B2 Size	nnn	tons	SIZE_B2
Cooler Flow Switch	On/Off		COOLFLOW

CCN MAINTENANCE TABLES — DUALCHIL

DESCRIPTION	VALUE	UNITS	POINT NAME
Dual Chiller Link Good?	Yes/No		DC_LINK
Master Chiller Role	Stand Alone, Lead Chiller, Lag Chiller		MC_ROLE
Slave Chiller Role	Stand Alone, Lead Chiller, Lag Chiller		SC_ROLE
Lead Chiller Ctrl Point	snnn.n	°F	LEAD_CP
Lag Chiller Ctrl Point	snnn.n	°F	LAG_CP
Control Point	snnn.n	°F	CTRL_PNT
Cool EnteringFluid-Slave	snnn.n	°F	COOLEWTS
Cool Leaving Fluid-Slave	snnn.n	°F	COOLLWTS
Cooler Entering Fluid	snnn.n	°F	COOL_EWT
Cooler Leaving Fluid	snnn.n	°F	COOL_LWT
Lead/Lag Leaving Fluid	snnn.n	°F	DUAL_LWT
Percent Avail.Capacity	0-100	%	CAP_A
Percent Avail.Cap.Slave	0-100	%	CAP_A_S
Lag Start Delay Time	hh:mm		LAGDELAY
Load/Unload Factor	snnn.n		SMZ
Load/Unload Factor-Slave	snnn.n		SMZSLAVE
Lead SMZ Clear Commanded	Yes/No		LEADSMZC
Lag SMZ Clear Commanded	Yes/No		LAG_SMZC
Lag Commanded Off?	Yes/No		LAG_OFF
Dual Chill Lead CapLimit	0-100	%	DCLDCAPL
Dual Chill Lag CapLimit	0-100	%	DCLGCAPL

APPENDIX C — FACTORY SETTINGS FOR PUMP AND MANUAL STARTERS

PUMP OPTION	PUMP SIZE	UNIT VOLTAGE V-Hz (3 Ph)	OVERLOAD SETTING
1, 8	1.0 HP	208/230-60 380-60 460-60 575-60	4.0 2.0 1.6 2.4
2, 9	1.5 HP	208/230-60 380-60 460-60 575-60	5.4 2.7 2.2 3.3
3, B	2.0 HP	208/230-60 380-60 460-60 575-60	6.6 3.3 2.6 4.0
4, C	3.0 HP	208/230-60 380-60 460-60 575-60	8.8 4.4 3.5 5.3
5, 6, D, F	5.0 HP	208/230-60 380-60 460-60 575-60	14.0 7.0 5.6 8.5
7, G	7.5 HP	208/230-60 380-60 460-60 575-60	22.8 11.4 9.1 13.8

APPENDIX D — OPTIONAL BACNET COMMUNICATIONS WIRING

Optional BACnet Communications Wiring —

The following section is used to configure the UPC Open controller which is used when the BACnet communications option is selected. The UPC Open controller is mounted in the main control box per unit components arrangement diagrams.

TO ADDRESS THE UPC OPEN CONTROLLER — The user must give the UPC Open controller an address that is unique on the BACnet* network. Perform the following procedure to assign an address:

1. If the UPC Open controller is powered, pull the screw terminal connector from the controller's power terminals labeled Gnd and HOT. The controller reads the address each time power is applied to it.

2. Using the rotary switches (see Fig. A and B), set the controller's address. Set the Tens (10's) switch to the tens digit of the address, and set the Ones (1's) switch to the ones digit.

As an example in Fig. B, if the controller's address is 25, point the arrow on the Tens (10's) switch to 2 and the arrow on the Ones (1's) switch to 5.
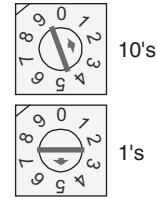
Fig. B — Address Rotary Switches

BACNET DEVICE INSTANCE ADDRESS — The UPC Open controller also has a BACnet Device Instance address. This Device Instance MUST be unique for the complete BACnet system in which the UPC Open controller is installed. The Device Instance is auto generated by default and is derived by adding the MAC address to the end of the Network Number. The Network Number of a new UPC Open controller is 16101, but it can be changed using i-Vu® Tools or BACView device. By default, a MAC address of 20 will result in a Device Instance of 16101 + 20 which would be a Device Instance of 1610120.
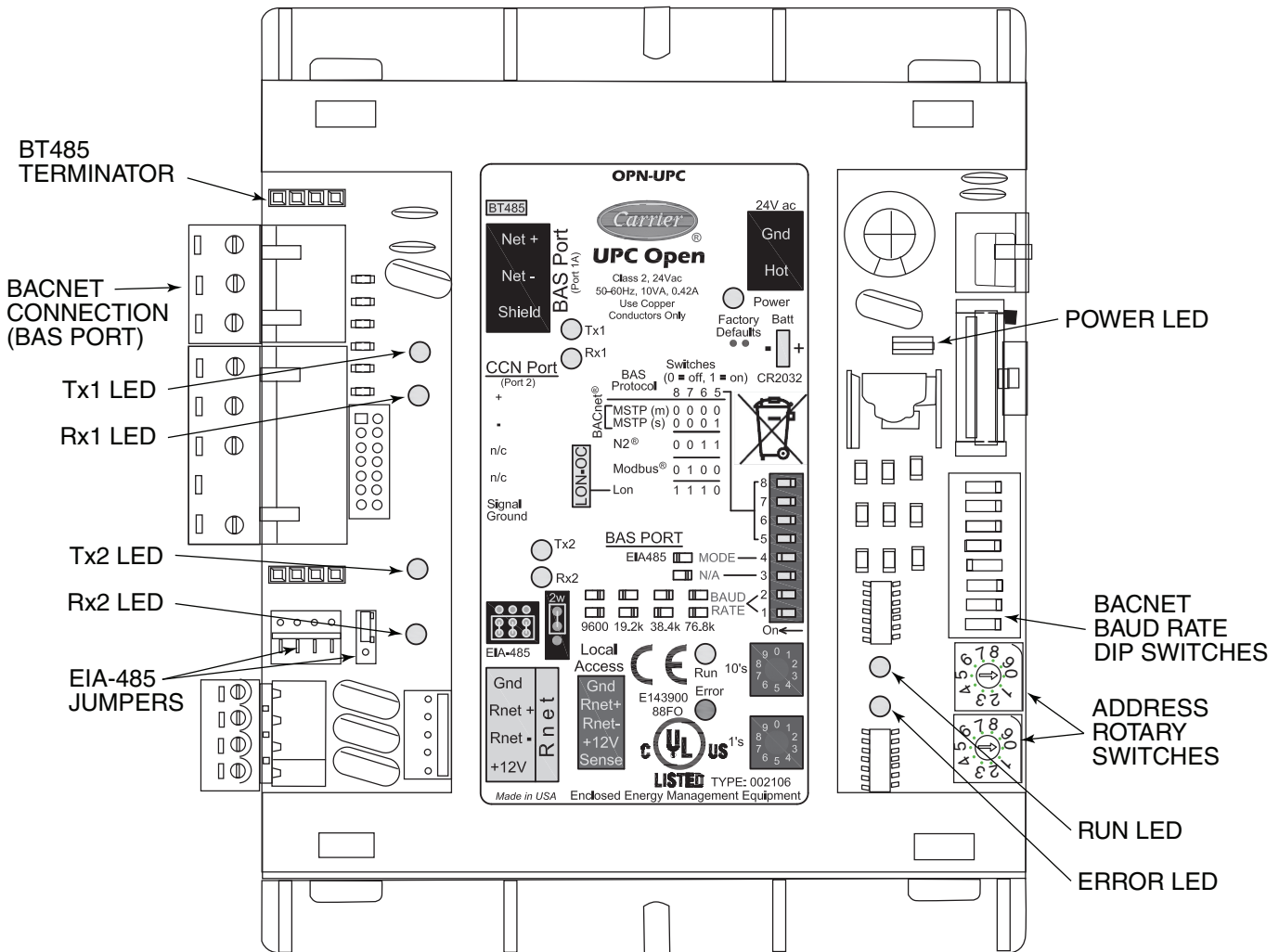
Fig. A — UPC Open Controller

* Sponsored by ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers).

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APPENDIX D — OPTIONAL BACNET COMMUNICATIONS WIRING (cont)

CONFIGURING THE BAS PORT FOR BACNET MS/TP — Use the same baud rate and communication settings for all controllers on the network segment. The UPC Open controller is fixed at 8 data bits, No Parity, and 1 Stop bit for this protocol's communications.

If the UPC Open controller has been wired for power, pull the screw terminal connector from the controller's power terminals labeled Gnd and HOT. The controller reads the DIP Switches and jumpers each time power is applied to it.

Set the BAS Port DIP switch DS3 to "enable." Set the BAS Port DIP switch DS4 to "E1-485." Set the BMS Protocol DIP switches DS8 through DS5 to "MSTP." See Table A.

Table A — SW3 Protocol Switch Settings for MS/TP

DS8	DS7	DS6	DS5	DS4	DS3
Off	Off	Off	Off	On	Off

Verify that the EIA-485 jumpers below the CCN Port are set to EIA-485 and 2W.

The example in Fig. C shows the BAS Port DIP Switches set for 76.8k (Carrier default) and MS/TP.

Set the BAS Port DIP Switches DS2 and DS1 for the appropriate communications speed of the MS/TP network (9600, 19.2k, 38.4k, or 76.8k bps). See Fig. D and Table B.

Table B — Baud Selection Table

BAUD RATE	DS2	DS1
9,600	Off	Off
19,200	On	Off
38,400	Off	On
76,800	On	On

WIRING THE UPC OPEN CONTROLLER TO THE MS/TP NETWORK — The UPC Open controller communicates using BACnet on an MS/TP network segment communications at 9600 bps, 19.2 kbps, 38.4 kbps, or 76.8 kbps.
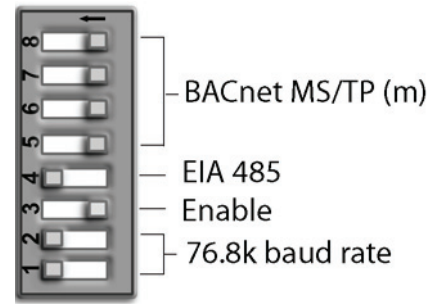
Fig. C — DIP Switches

Wire the controllers on an MS/TP network segment in a daisy-chain configuration. Wire specifications for the cable are 22 AWG (American Wire Gage) or 24 AWG, low-capacitance, twisted, stranded, shielded copper wire. The maximum length is 2000 ft.

Install a BT485 terminator on the first and last controller on a network segment to add bias and prevent signal distortions due to echoing. See Fig. A, D, and E.

To wire the UPC Open controller to the BAS network:

1. Pull the screw terminal connector from the controller's BAS Port.
2. Check the communications wiring for shorts and grounds.
3. Connect the communications wiring to the BAS port's screw terminals labeled Net +, Net -, and Shield.

NOTE: Use the same polarity throughout the network segment.

4. Insert the power screw terminal connector into the UPC Open controller's power terminals if they are not currently connected.
5. Verify communication with the network by viewing a module status report. To perform a module status report using the BACview keypad/display unit, press and hold the "FN" key then press the "." Key.
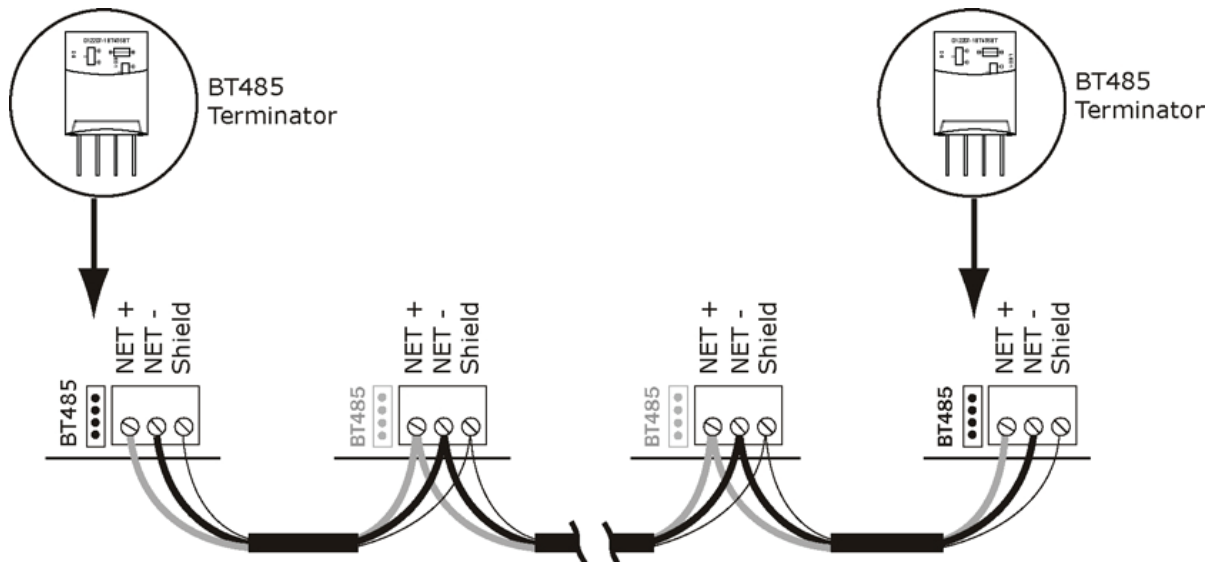
Fig. D — Network Wiring
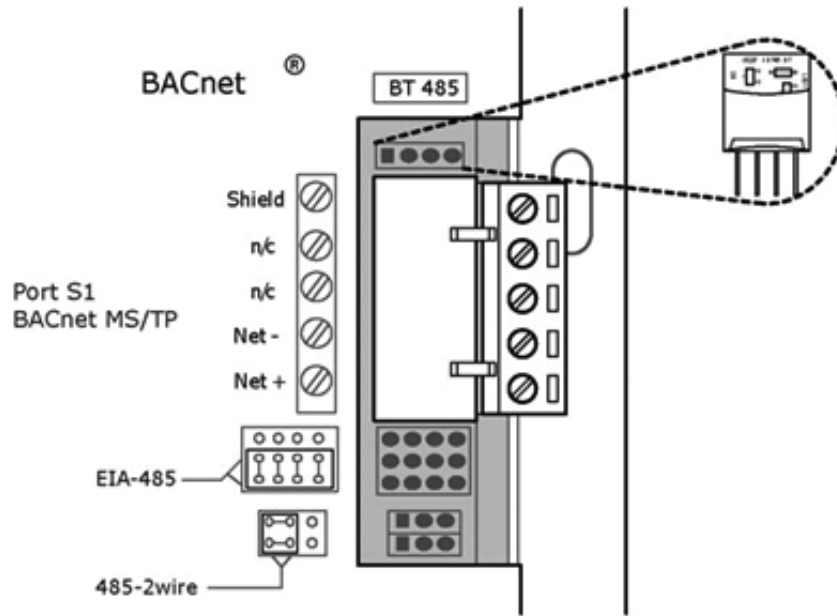
Fig. E — BT485 Terminator Installation

To install a BT485 terminator, push the BT485 terminator on to the BT485 connector located near the BACnet connector.

NOTE: The BT485 terminator has no polarity associated with it.

To order a BT485 terminator, consult Commercial Products i-Vu Open Control System Master Prices.

MS/TP WIRING RECOMMENDATIONS — Recommendations are shown in Tables C and D. The wire jacket and UL temperature rating specifications list two acceptable alternatives. The Halar specification has a higher temperature rating and a tougher outer jacket than the SmokeGard specification, and it is appropriate for use in applications where the user is concerned about abrasion. The Halar jacket is also less likely to crack in extremely low temperatures.

NOTE: Use the specified type of wire and cable for maximum signal integrity.

Table C — MS/TP Wiring Recommendations

SPECIFICATION	RECOMMMENDATION
Cable	Single twisted pair, low capacitance, CL2P, 22 AWG (7x30), TC foam FEP, plenum rated cable
Conductor	22 or 24 AWG stranded copper (tin plated)
Insulation	Foamed FEP 0.015 in. (0.381 mm) wall 0.060 in. (1.524 mm) O.D.
Color Code	Black/White
Twist Lay	2 in. (50.8 mm) lay on pair 6 twists/foot (20 twists/meter) nominal
Shielding	Aluminum/Mylar shield with 24 AWG TC drain wire
Jacket	SmokeGard Jacket (SmokeGard PVC) 0.021 in. (0.5334 mm) wall 0.175 in. (4.445 mm) O.D. Halar Jacket (E-CTFE) 0.010 in. (0.254 mm) wall 0.144 in. (3.6576 mm) O.D.
DC Resistance	15.2 Ohms/1000 feet (50 Ohms/km) nominal
Capacitance	12.5 pF/ft (41 pF/meter) nominal conductor to conductor
Characteristic Impedance	100 Ohms nominal
Weight	12 lb/1000 feet (17.9 kg/km)
UL Temperature Rating	SmokeGard 167°F (75°C) Halar -40 to 302°F (-40 to 150°C)
Voltage	300 Vac, power limited
Listing	UL: NEC CL2P, or better

LEGEND

AWG — American Wire Gage
CL2P — Class 2 Plenum Cable
DC — Direct Current
FEP — Fluorinated Ethylene Polymer
NEC — National Electrical Code
O.D. — Outside Diameter
TC — Tinned Copper
UL — Underwriters Laboratories

Table D — Open System Wiring Specifications and Recommended Vendors

WIRING SPECIFICATIONS		RECOMMENDED VENDORS AND PART NUMBERS			
Wire Type	Description	Connect Air International	Belden	RMCORP	Contractors Wire and Cable
MS/TP Network (RS-485)	22 AWG, single twisted shielded pair, low capacitance, CL2P, TC foam FEP, plenum rated. See MS/TP Installation Guide for specifications.	W221P-22227	—	25160PV	CLP0520LC
	24 AWG, single twisted shielded pair, low capacitance, CL2P, TC foam FEP, plenum rated. See MS/TP Installation Guide for specifications.	W241P-2000F	82841	25120-OR	—
Rnet	4 conductor, unshielded, CMP, 18 AWG, plenum rated.	W184C-2099BLB	6302UE	21450	CLP0442

LEGEND

AWG — American Wire Gage
CL2P — Class 2 Plenum Cable
CMP — Communications Plenum Rated
FEP — Fluorinated Ethylene Polymer
TC — Tinned Copper

LOCAL ACCESS TO THE UPC OPEN CONTROLLER — The user can use a BACview6 handheld keypad display unit or the Virtual BACview software as a local user interface to an Open controller. These items let the user access the controller network information. These are accessory items and do not come with the UPC Open controller.

The BACview6 unit connects to the local access port on the UPC Open controller. See Fig. F. The BACview software must be running on a laptop computer that is connected to the local access port on the UPC Open controller. The laptop will require an additional USB link cable for connection.

See the *BACview Installation and User Guide* for instructions on connecting and using the BACview6 device.

To order a BACview6 Handheld (BV6H), consult Commercial Products i-Vu Open Control System Master Prices.

CONFIGURING THE UPC OPEN CONTROLLER'S PROPERTIES — The UPC Open device and *Comfort*Link control must be set to the same CCN Address (Element) number and CCN Bus number. The factory default settings for CCN Element and CCN Bus number are 1 and 0 respectively.

If modifications to the default Element and Bus number are required, both the *Comfort*Link and UPC Open configurations must be changed.

The following configurations are used to set the CCN Address and Bus number in the *Comfort*Link control. These configurations can be changed using the scrolling marquee display or accessory Navigator handheld device.

Configuration→CCN→CCN.A (CCN Address)
Configuration→CCN→CCN.B (CCN Bus Number)

The following configurations are used to set the CCN Address and Bus Number in the UPC Open controller. These configurations can be changed using the accessory BACview6 display.

Navigation: BACview→CCN
Home: Element Comm Stat
Element: 1
Bus: 0
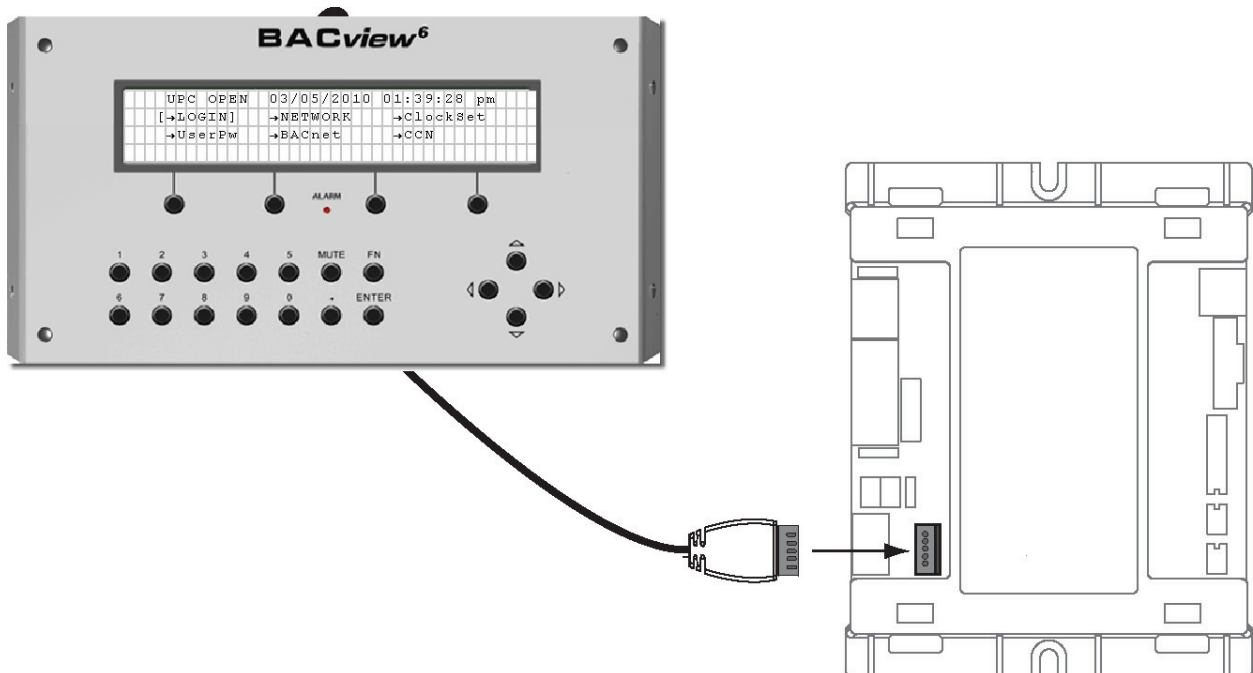
Fig. F — BACview6 Device Connection

If the UPC Open is used with the chiller application of Lead/Lag/Standby, all chillers and UPC Open's CCN element numbers must be changed to a unique number in order to follow CCN specifications. In this application, there can only be a maximum of 3 UPC Open controllers on a CCN bus.

For the CCN Alarm Acknowledger configuration, the UPC Open defaults to CCN Acknowledger. If a Chiller Lead/Lag/Standby application is being used, then the Carrier technician must change the configuration to only one CCN Acknowledger on the CCN bus.

For the CCN Time Broadcaster configuration, the UPC Open defaults to CCN Time Broadcaster. If the Chiller Lead/Lag/Standby application is used, then the Carrier technician must change the configuration to only one CCN Time Broadcaster on the CCN bus.

TROUBLESHOOTING — If there are problems wiring or addressing the UPC Open controller, contact Carrier Technical Support.

COMMUNICATION LEDS — The LEDs indicate if the controller is communicating with the devices on the network. See Tables E and F. The LEDs should reflect communication traffic based on the baud rate set. The higher the baud rate the more solid the LEDs become. See Fig. A for location of LEDs on UPC Open module.

REPLACING THE UPC OPEN BATTERY — The UPC Open controller's 10-year lithium CR2032 battery provides a minimum of 10,000 hours of data retention during power outages.

> IMPORTANT: Power must be **ON** to the UPC Open when replacing the battery, or the date, time, and trend data will be lost.

Remove the battery from the controller, making note of the battery's polarity. Insert the new battery, matching the battery's polarity with the polarity indicated on the UPC Open controller.

NETWORK POINTS LIST — The points list for the controller is shown in Table G.

Refer to Appendix B for additional information on CCN point name.

Table E — LED Status Indicators

LED	STATUS
Power	Lights when power is being supplied to the controller. The UPC Open controller is protected by internal solid-state polyswitches on the incoming power and network connections. These polyswitches are not replaceable and will reset themselves if the condition that caused the fault returns to normal.
Rx	Lights when the controller receives data from the network segment; there is an Rx LED for Ports 1 and 2.
Tx	Lights when the controller transmits data to the network segment; there is an Rx LED for Ports 1 and 2.
Run	Lights based on controller status. See Table F.
Error	Lights based on controller status. See Table F.

Table F — Run and Error LEDs Controller and Network Status Indication

RUN LED	ERROR LED	STATUS
2 flashes per second	Off	Normal
2 flashes per second	2 flashes, alternating with **Run** LED	Five minute auto-restart delay after system error
2 flashes per second	3 flashes, then off	Controller has just been formatted
2 flashes per second	1 flash per second	Controller is alone on the network
2 flashes per second	On	Exec halted after frequent system errors or control programs halted
5 flashes per second	On	Exec start-up aborted, Boot is running
5 flashes per second	Off	Firmware transfer in progress, Boot is running
7 flashes per second	7 flashes per second, alternating with **Run** LED	Ten second recovery period after brownout
14 flashes per second	14 flashes per second, alternating with **Run** LED	Brownout

Table G — Network Points List

POINT DESCRIPTION	CCN POINT NAME	READ/ WRITE	UNITS	DEFAULT VALUE	RANGE	BACNET OBJECT ID	BACNET OBJECT NAME
4-20 ma Demand Signal	LMT_MA	R	mA			AV:36	lmt_ma_1
4-20 ma Reset Signal	RST_MA	R	°F			AV:33	rst_ma_1
Active Demand Limit	DEM_LIM	R/W	%	100	0 - 100	AV:2	dem_lim_1
Active Setpoint	SP	R	°F			AV:4	sp_1
Alarm State	ALM	R			1 = Normal 2 = Alert 3 = Alarm	MSV:1	alm_msv_1
CCN Chiller	CHIL_S_S	R/W		Start	Start/Stop	BV:4	chil_s_s_1
CCN Loadshed Signal	DL_STAT	R				AV:37	dl_stat_1
Circuit A Run Hours	HR_CIRA	R	hr			AV:59	hr_cira_1
Circuit A Starts	CY_CIRA	R				AV:65	cy_cira_1
Circuit B Run Hours	HR_CIRB	R	hr			AV:62	hr_cirb_1
Circuit B Starts	CY_CIRB	R				AV:68	cy_cirb_1
Coil Cleaning Maint.Done	CL_MAINT	R/W		No	Yes/No	BV:54	cl_maint_1
Coil Cleaning Srvc Inter	SI_COIL	R/W	hr	8760	0 - 65535	AV:50	si_coil_1
Coil Service Countdown	CL_CDOWN	R	hr			AV:49	cl_cdown_1
Comp A1 Unload Time	A1UNLTME	R				AV:73	a1unltme_1
Compr Return Gas Temp	TMP_RGTA	R	°F			AV:20	tmp_rgta_1
Compr Return Gas Temp	TMP_RGTB	R	°F			AV:28	tmp_rgtb_1
Compressor A1 Feedback	K_A1_FBK	R				BV:16	k_a1_fbk_1
Compressor A1 Relay	K_A1_RLY	R				BV:13	k_a1_rly_1
Compressor A1 Run Hours	HR_A1	R	hr			AV:60	hr_a1_1
Compressor A1 Starts	CY_A1	R				AV:66	cy_a1_1
Compressor A2 Feedback	K_A2_FBK	R				BV:17	k_a2_fbk_1
Compressor A2 Relay	K_A2_RLY	R				BV:14	k_a2_rly_1
Compressor A2 Run Hours	HR_A2	R	hr			AV:61	hr_a2_1
Compressor A2 Starts	CY_A2	R				AV:67	cy_a2_1
Compressor B1 Feedback	K_B1_FBK	R				BV:20	k_b1_fbk_1
Compressor B1 Relay	K_B1_RLY	R				BV:18	k_b1_rly_1
Compressor B1 Run Hours	HR_B1	R	hr			AV:63	hr_b1_1
Compressor B1 Starts	CY_B1	R				AV:69	cy_b1_1
Compressor B2 Feedback	K_B2_FBK	R				BV:21	k_b2_fbk_1
Compressor B2 Relay	K_B2_RLY	R				BV:19	k_b2_rly_1
Compressor B2 Run Hours	HR_B2	R	hr			AV:64	hr_b2_1
Compressor B2 Starts	CY_B2	R				AV:70	cy_b2_1
Control Mode	CONTROL	R			1 = Test 2 = Local Off 3 = CCN Off 4 = Clock Off 5 = Emergency Stop 6= Local On 7 = CCN On 8 = Clock On 9 = Heat Enabled 10 = Pump Delay	MSV:2	stat_msv_1
Control Point	CTRL_PNT	R/W	°F	44.0	-20 - 70	AV:5	ctrl_pnt_1
Cooler Entering Fluid	COOL_EWT	R	°F			AV:30	cool_ewt_1
Cooler Flow Switch	COOLFLOW	R				BV:11	coolflow_1
Cooler Freeze Protection	MODE_16	R				BV:42	mode_16_1
Cooler Leaving Fluid	COOL_LWT	R	°F			AV:31	cool_lwt_1
Cooler LWT Setpoint	LWT_SP	R	°F			AV:38	lwt_sp_1
Cooler Pump 1 Interlock	PMP1_FBK	R				BV:9	pmp1_fbk_1
Cooler Pump 2 Interlock	PMP2_FBK	R				BV:10	pmp2_fbk_1
Cooler Pump Relay 1	COOLPMP1	R				BV:7	coolpmp1_1
Cooler Pump Relay 2	COOLPMP2	R				BV:8	coolpmp2_1
Cooler Pump Select	PMP_SLCT	R				AV:40	pmp_slct_1
Cooler Pump Shutdown Dly	PUMP_DLY	R/W	min	1	0 - 10	AV:41	pump_dly_1
Cooler/Pump Heater	COOL_HTR	R				BV:24	cool_htr_1
Cooling Ramp Loading	CRAMP	R/W		1.0	0.2 - 2.0	AV:56	cramp_1
Cooling Setpoint 1	CSP1	R/W	°F	44.0	-20 - 70	AV:53	csp1_1

LEGEND

R — Read
W — Write

Table G — Network Points List (cont)

POINT DESCRIPTION	POINT NAME	READ/WRITE	UNITS	DEFAULT VALUE	RANGE	BACNET OBJECT ID	BACNET OBJECT NAME
Cooling Setpoint 2	CSP2	R/W	°F	44.0	-20 - 70	AV:54	csp2_1
CSM Controlling Chiller	MODE_1	R				BV:30	mode_1_1
Demand Level 1		R	%			AV:75	dmv_lvl_1_perct_1
Demand Level 2		R	%			AV:76	dmv_lvl_2_perct_1
Demand Level 3		R	%			AV:77	dmv_lvl_3_perct_1
Demand Limit Switch 1	DMD_SW1	R				BV:25	dmd_sw1_1
Demand Limit Switch 2	DMD_SW2	R				BV:26	dmd_sw2_1
Demand/Sound Limited	MODE_15	R				BV:41	mode_15_1
Discharge Gas Temp	DISGAS	R	°F			AV:15	disgas_1
Discharge Pressure	DP_A	R	psig			AV:13	dp_a_1
Discharge Pressure	DP_B	R	psig			AV:23	dp_b_1
Dual Setpoint	MODE_13	R				BV:39	mode_13_1
Dual Setpoint Switch	DUAL_IN	R				BV:29	dual_in_1
Element Comm Status		R				BV:2999	element_stat_1
Element Communications Alarm		R				BV:58	comm_lost_alm_1
Emergency Stop	EMSTOP	R/W		Enabled	Enabled/Emstop	BV:6	emstop_1
Entering Fluid Temp	EWT	R	°F			AV:6	ewt_1
EXV % Open	EXV_A	R	%			AV:18	exv_a_1
EXV % Open	EXV_B	R	%			AV:27	exv_b_1
Fan 1 Relay	FAN_1	R				BV:22	fan_1_1
Fan 2 Relay	FAN_2	R				BV:23	fan_2_1
Head Setpoint	HSP	R	°F			AV:29	hsp_1
Heat Request	HEAT_REQ	R				BV:28	heat_req_1
High SCT Circuit A	MODE_21	R				BV:47	mode_21_1
High SCT Circuit B	MODE_22	R				BV:48	mode_22_1
High Temperature Cooling	MODE_18	R				BV:44	mode_18_1
Ice Done	ICE_DONE	R				BV:27	ice_done_1
Ice Setpoint	CSP3	R/W	°F	32.0	-20 - 32	AV:55	csp3_1
Lead/Lag Circuit Select	LEAD_TYP	R/W		1	1 = Automatic 2 = Circuit A Leads 3 = Circuit B Leads	AV:43	lead_typ_1
Lead/Lag Circuit Select	LEAD_TYP	R				MSV:6	lead_typ_msv_1
Lead/Lag Leaving Fluid	DUAL_LWT	R	°F			AV:32	dual_lwt_1
Leadpump	LEADPUMP	R				MSV:9	leadpump_msv_1
Leaving Fluid Temp - Prime Variable	LWT	R	°F			AV:7	lwt_1
Loading Sequence Select	SEQ_TYPE	R				AV:74	seq_type_1
Local Schedule		R				BV:1	schedule_1
Low Cooler Suction Temp A	MODE_7	R				BV:35	mode_7_1
Low Cooler Suction Temp B	MODE_8	R				BV:36	mode_8_1
Low Sound Active	LSACTIVE	R				BV:2	lsactive_1
Low Sound Mode	MODE_25	R				BV:51	mode_25_1
Low Temperature Cooling	MODE_17	R				BV:43	mode_17_1
Machine Operating Hours	HR_MACH	R	hr			AV:57	hr_mach_1
Machine Starts	CY_MACH	R				AV:58	cy_mach_1
Making ICE	MODE_19	R				BV:45	mode_19_1
Master/Slave Control	MODE_3	R				BV:32	mode_3_1
Minimum Comp. On Time	MODE_23	R				BV:49	mode_23_1
Minimum Load Valve Relay	MLV_RLY	R				BV:15	mlv_rly_1
Minimum OFF Time Active	MODE_10	R				BV:38	mode_10_1
Minutes Off Time	DELAY	R/W	min	0	0 - 15	AV:42	delay_1
Occupied	OCC	R				BV:3	occ_1
Outside Air Temperature	OAT	R	°F			AV:34	oat_1
Override Modes in Effect	MODE	R				BV:5	mode_1
Percent Available Cap.	CAP_A	R	%			AV:12	capa_a_1
Percent Available Cap.	CAPB_A	R	%			AV:22	capb_a_1

LEGEND

R — Read
W — Write

Table G — Network Points List (cont)

POINT DESCRIPTION	POINT NAME	READ/ WRITE	UNITS	DEFAULT VALUE	RANGE	BACNET OBJECT ID	BACNET OBJECT NAME
Percent Total Capacity	CAP_T	R	%			AV:3	cap_t_1
Percent Total Capacity	CAPA_T	R	%			AV:11	capa_t_1
Percent Total Capacity	CAPB_T	R	%			AV:21	capb_t_1
Pump 1 Maintenance Done	P1_MAINT	R/W		No	Yes/No	BV:52	p1_maint_1
Pump 1 Run Hours	HR_PUMP1	R	hr			AV:71	hr_pump1_1
Pump 1 Service Countdown	P1_CDOWN	R	hr			AV:46	p1_cdown_1
Pump 2 Maintenance Done	P2_MAINT	R/W		No	Yes/No	BV:53	p2_maint_1
Pump 2 Run Hours	HR_PUMP2	R	hr			AV:72	hr_pump2_1
Pump 2 Service Countdown	P2_CDOWN	R	hr			AV:47	p2_cdown_1
Pump Changeover Hours	PMP_DLTA	R/W	hr	500	10 - 2000	AV:39	pmp_dlta_1
Pump Off Delay Time	MODE_24	R				BV:50	mode_24_1
Pump Service Interval	SI_PUMPS	R/W	hr	8760	0 - 65535	AV:48	si_pumps_1
Ramp Load Limited	MODE_5	R				BV:33	mode_5_1
Requested Stage	STAGE	R				AV:9	stage_1
Rotate Cooler Pumps Now	ROT_PUMP	R/W		No	No/Yes	BV:12	rot_pump_1
Saturated Condensing Tmp	TMP_SCTA	R	°F			AV:16	tmp_scta_1
Saturated Condensing Tmp	TMP_SCTB	R	°F			AV:25	tmp_sctb_1
Saturated Suction Temp	TMP_SSTA	R	°F			AV:17	tmp_ssta_1
Saturated Suction Temp	TMP_SSTB	R	°F			AV:26	tmp_sstb_1
Slow Change Override	MODE_9	R				BV:37	mode_9_1
Space Temperature	SPT	R/W	°F	8760	-40.0 - 245	AV:35	spt_1
Storing ICE	MODE_20	R				BV:46	mode_20_1
Strainer Maint. Done	ST_MAINT	R/W		No	Yes/No	BV:55	st_maint_1
Strainer Srvc Countdown	ST_CDOWN	R	hr			AV:52	st_cdown_1
Strainer Srvc Interval	SI_STRNR	R/W	hr	8760	0 - 65535	AV:51	si_strnr_1
Suction Pressure	SP_A	R	psig			AV:14	sp_a_1
Suction Pressure	SP_B	R	psig			AV:24	sp_b_1
Suction Superheat Temp	SH_A	R	°^F			AV:44	sh_a_1
Suction Superheat Temp	SH_B	R	°^F			AV:45	sh_b_1
System Cooling Demand Level		R				AV:9006	cool_demand_level_1
System Demand Limiting		R				BV:57	dem_lmt_act_1
Temperature Reset	MODE_14	R				BV:40	mode_14_1
Timed Override In Effect	MODE_6	R				BV:34	mode_6_1
User Defined Analog 1		R/W	sq m			AV:2901	user_analog_1_1
User Defined Analog 2		R/W	sq m			AV:2902	user_analog_2_1
User Defined Analog 3		R/W	sq m			AV:2903	user_analog_3_1
User Defined Analog 4		R/W	sq m			AV:2904	user_analog_4_1
User Defined Analog 5		R/W	sq m			AV:2905	user_analog_5_1
User Defined Binary 1		R/W	sq m			BV:2911	user_binary_1_1
User Defined Binary 2		R/W	sq m			BV:2912	user_binary_2_1
User Defined Binary 3		R/W	sq m			BV:2913	user_binary_3_1
User Defined Binary 4		R/W	sq m			BV:2914	user_binary_4_1
User Defined Binary 5		R/W	sq m			BV:2915	user_binary_5_1
Var Head Press Output	VHP_ACT	R	mA			AV:19	vhp_act_1
WSM Controlling Chiller	MODE_2	R				BV:31	mode_2_1

LEGEND

R — Read
W — Write

APPENDIX E — MAINTENANCE SUMMARY AND LOG SHEETS

30RAP Maintenance Interval Requirements

	WEEKLY				
Compressor	Check oil level.		**Economizer**	None.	
Cooler	None.		**Controls**	Review Alarm/Alert History.	
Condenser	None.		**Starter**	None.	

	MONTHLY				
Compressor	Check oil level.		**Economizer**	None.	
Cooler	None.		**Controls**	Inspect sight glass for moisture and refrigerant level.	
Condenser	None.		**Starter**	None.	

	QUARTERLY				
Compressor	Check oil level		**Economizer**	None.	
Cooler	Check refrigerant charge. Check all connections for leaks.		**Controls**	Perform an Automated Controls test. Run all compressors and ensure proper operation.	
Condenser	None.		**Starter**	Ensure operation of units flow switch.	

	ANNUALLY				
Compressor	Check Oil Level. Obtain and test an oil sample.		**Economizer**	Verify proper operation of EXVs and TXVs	
Cooler	Check refrigerant charge. Check all connections for leaks. Check approach on unit to determine if tubes need cleaning. Check for temperature drop across filter drier to determine if filter needs replacement.		**Controls**	Perform an Automated Controls test. Run all compressors and ensure proper operation. Ensure operation of unit flow switch.	
Condenser	Inspect all coils and clean. Check condenser approach to determine if tubes need to be cleaned.		**Starter**	Inspect all electrical connections and tighten as needed. Measure current to each compressor and inspect contactors.	

NOTE: Equipment failures caused by lack of adherence to the Maintenance Interval Requirements are not covered under warranty.

30RAP Weekly Maintenance Log

Plant _____

Machine Model No. _____

DATE	OIL LEVEL	CHECK ALARMS / FAULTS	OPERATOR INITIALS	REMARKS

NOTE: Equipment failures caused by lack of adherence to the Maintenance Interval Requirements are not covered under warranty.

30RAP Monthly Maintenance Log

			1	2	3	4	5	6	7	8	9	10	11	12
Month														
Date			/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /
Operator														

UNIT SECTION	ACTION	UNIT	ENTRY											
Compressor	Check Oil Level	yes/no												
	Send Oil Sample Out for Analysis	yes/no	Annually											
	Leak Test	ppm												
Cooler	Inspect and Clean Cooler	yes/no	Every 3 - 5 Years											
	Inspect Cooler Heater	amps												
	Leak Test	yes/no												
	Record Water Pressure Differential (PSI)	PSI												
	Inspect Water Pumps	yes/no												
Condenser	Leak Test	ppm												
	Inspect and Clean Condenser Coil	yes/no	Annually											
Controls	General Cleaning and Tightening Connections	yes/no	Annually											
	Check Pressure Transducers	yes/no												
	Confirm Accuracy of Thermistors	yes/no												
Starter	General Tightening & Cleaning Connections	yes/no	Annually											
	Inspect All Contactors	yes/no												
System	Check Refrigerant Charge	yes/no												
	Verify Operation Of EXVs And Record Position	0-100%												
	Record System Super Heat	deg. F												

NOTE: Equipment failures caused by lack of adherence to the Maintenance Interval Requirements are not covered under warranty.

APPENDIX E — MAINTENANCE SUMMARY AND LOG SHEETS (cont)

30RAP Seasonal Shutdown Log

Month		1	2	3	4	5	6	7	8	9	10	11	12
Date		/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /
Operator													

UNIT SECTION	ACTION	ENTRY											
Cooler	Isolate and Drain Cooler												
	Add Glycol for Freeze Protection												
Controls	Do Not Disconnect Control Power												

NOTE: Equipment failures caused by lack of adherence to the Maintenance Interval Requirements are not covered under warranty.

START-UP CHECKLIST FOR 30RAP LIQUID CHILLER
(Remove and use for Job File)

I. Project Information

JOB NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP_____

INSTALLING CONTRACTOR _____

SALES OFFICE _____

START-UP PERFORMED BY _____

Design Information

CAPACITY	CEAT	EWT	LWT	FLUID TYPE	FLOW RATE	P.D.

UNIT MODEL _____ SERIAL _____

II. Preliminary Equipment Check

IS THERE ANY PHYSICAL DAMAGE?	☐ YES ☐ NO

DESCRIPTION _____

_____

1. UNIT IS INSTALLED LEVEL AS PER THE INSTALLATION INSTRUCTIONS.	☐ YES ☐ NO
2. POWER SUPPLY AGREES WITH THE UNIT NAMEPLATE.	☐ YES ☐ NO
3. ELECTRICAL POWER WIRING IS INSTALLED PROPERLY.	☐ YES ☐ NO
4. UNIT IS PROPERLY GROUNDED.	☐ YES ☐ NO
5. ELECTRICAL CIRCUIT PROTECTION HAS BEEN SIZED AND INSTALLED PROPERLY.	☐ YES ☐ NO
6. ALL TERMINALS ARE TIGHT.	☐ YES ☐ NO
7. ALL PLUG ASSEMBLIES ARE TIGHT.	☐ YES ☐ NO
8. ALL CABLES AND THERMISTORS HAVE BEEN INSPECTED FOR CROSSED WIRES.	☐ YES ☐ NO
9. ALL THERMISTORS ARE FULLY INSERTED INTO WELLS.	☐ YES ☐ NO

Chilled Water System Check

1. ALL CHILLED WATER VALVES ARE OPEN.	☐ YES ☐ NO
2. ALL PIPING IS CONNECTED PROPERLY.	☐ YES ☐ NO
3. ALL AIR HAS BEEN PURGED FROM THE SYSTEM.	☐ YES ☐ NO
4. CHILLED WATER PUMP IS OPERATING WITH THE CORRECT ROTATION.	☐ YES ☐ NO

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

Catalog No. 04-53300067-01   Printed in U.S.A.   Form 30RAP-2T   Pg CL-1   12-10   Replaces: 30RAP-1T

5. CHILLED WATER PUMP STARTER INTERLOCKED WITH CHILLER. ☐ YES ☐ NO

6. CHILLED WATER FLOW SWITCH IS OPERATIONAL. ☐ YES ☐ NO

7. WATER LOOP VOLUME GREATER THAN MINIMUM REQUIREMENTS. (See Table 40). ☐ YES ☐ NO

8. PROPER LOOP FREEZE PROTECTION PROVIDED TO _____ °F (°C). ☐ YES ☐ NO
   ANTIFREEZE TYPE _____ CONCENTRATION _____%.
   IF OUTDOOR AMBIENT IS BELOW 32 F (0° C) THEN ITEMS 9-11 HAVE TO BE
   COMPLETED TO PROVIDE COOLER FREEZE PROTECTION TO –20 F (–29 C). (REFER
   TO WINTER SHUTDOWN FOR PROPER COOLER WINTERIZATION PROCEDURE.)

9. OUTDOOR PIPING WRAPPED WITH ELECTRIC HEATER TAPE, ☐ YES ☐ NO
   INSULATED AND OPERATIONAL.

10. COOLER HEATERS INSTALLED AND OPERATIONAL. ☐ YES ☐ NO

11. CHILLED WATER PUMP CONTROLLED BY CHILLER. ☐ YES ☐ NO

III. Unit Start-Up

1. COMPRESSOR OIL LEVEL IS CORRECT. ☐ YES ☐ NO

2. VERIFY COMPRESSOR MOUNTING BOLT TORQUE IS 7-10 FT-LB. (9.5-13.5 N-M). ☐ YES ☐ NO

3. LEAK CHECK UNIT. LOCATE, REPAIR AND REPORT ANY REFRIGERANT LEAKS. ☐ YES ☐ NO

4. VOLTAGE IS WITHIN UNIT NAMEPLATE RANGE. ☐ YES ☐ NO

5. CONTROL TRANSFORMER PRIMARY CONNECTION SET FOR PROPER VOLTAGE. ☐ YES ☐ NO

6. CONTROL TRANSFORMER SECONDARY VOLTAGE = _____

7. CHECK VOLTAGE IMBALANCE: A-B _____ A-C _____ B-C _____
   AVERAGE VOLTAGE = _____ (A-B + A-C + B-C)/3
   MAXIMUM DEVIATION FROM AVERAGE VOLTAGE = _____
   VOLTAGE IMBALANCE = _____% (MAX. DEVIATION/AVERAGE VOLTAGE) X 100
   VOLTAGE IMBALANCE LESS THAN 2%. ☐ YES ☐ NO
   (DO NOT START CHILLER IF VOLTAGE IMBALANCE IS GREATER THAN 2%.
   CONTACT LOCAL UTILITY FOR ASSISTANCE.)

8. VERIFY COOLER FLOW RATE. ☐ YES ☐ NO
   PRESSURE ENTERING COOLER   _____ psig (kPa)
   PRESSURE LEAVING COOLER   _____ psig (kPa)
   COOLER PRESSURE DROP   _____ psig (kPa)
   Psig X 2.31 ft./psi =   _____ ft of water
   kPa X 0.334 m/psi   _____ m of water
   COOLER FLOW RATE   _____ gpm (l/s) (See Cooler Pressure
                                                Drop Curves from
                                                Installation Instructions)

Start and Operate Machine. Complete the Following:

1. COMPLETE COMPONENT TEST. ☐ YES ☐ NO

2. CHECK REFRIGERANT AND OIL CHARGE. ☐ YES ☐ NO

3. RECORD COMPRESSOR MOTOR CURRENT. ☐ YES ☐ NO

4. RECORD CONFIGURATION SETTINGS. ☐ YES ☐ NO

5. RECORD OPERATING TEMPERATURES AND PRESSURES. ☐ YES ☐ NO

6. PROVIDE OPERATING INSTRUCTIONS TO OWNER'S PERSONNEL.   Instruction Time _____ hours.

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

OPERATING DATA:

RECORD THE FOLLOWING INFORMATION FROM THE PRESSURES AND TEMPERATURES MODES WHEN MACHINE IS IN A STABLE OPERATING CONDITION:

PRESSURE/TEMPERATURE

	CIRCUIT A	CIRCUIT B
DISCHARGE PRESSURE	DP.A	DP.B
SUCTION PRESSURE	SP.A	SP.B
SATURATED CONDENSING TEMP	SCT.A	SCT.B
SATURATED SUCTION TEMP	SST.A	SST.B
RETURN GAS TEMPERATURE	RGT.A	RGT.B
LIQUID LINE TEMPERATURE*		
DISCHARGE LINE TEMPERATURE*		

*Readings taken with a digital thermometer.

COOLER EWT	EWT	
COOLER LWT	LWT	
OUTDOOR-AIR TEMPERATURE	OAT	
CONTROL POINT	CTPT	
PERCENT TOTAL CAPACITY	CAP	
LEAD/LAG LEAVING FLUID	DLWT	(Dual Chiller Control Only)

Compressor Running Current — All readings taken at full load.

COMPRESSOR MOTOR CURRENT	L1	L2	L3
COMPRESSOR A1			
COMPRESSOR A2			
COMPRESSOR B1			
COMPRESSOR B2			

CONDENSER FAN MOTOR CURRENT	L1	L2	L3
FAN MOTOR 1			
FAN MOTOR 2			
FAN MOTOR 3			
FAN MOTOR 4			

COOLER PUMP MOTOR CURRENT	L1	L2	L3
COOLER PUMP 1			
COOLER PUMP 2			

Record Software Versions
MODE — RUN STATUS

SUB-MODE	ITEM	DISPLAY	ITEM EXPANSION
VERS	MBB		CESR-131460- _ _-_ _
	AUX1		CESR-131333- _ _-_ _
	EXV		CESR-131172- _ _-_ _
	EMM		CESR-131174- _ _-_ _
	MARQUEE		CESR-131171- _ _-_ _
	NAVIGATOR		CESR-131227- _ _-_ _

(PRESS ENTER AND ESCAPE SIMULTANEOUSLY TO OBTAIN SOFTWARE VERSIONS)

COMMENTS:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

SIGNATURES:

START-UP
TECHNICIAN _____

CUSTOMER
REPRESENTATIVE _____

DATE _____

DATE _____

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

III. Unit Start-Up (cont)

RECORD CONFIGURATION SETTINGS

UNIT (Configuration Settings)

SUBMODE	ITEM	ITEM EXPANSION	DISPLAY	ENTRY
		UNIT CONFIGURATION		
	SIZE	UNIT SIZE	XXX	
	SZA.1	COMPRESSOR A1 SIZE	XX	
	SZA.2	COMPRESSOR A2 SIZE	XX	
	SZA.3	COMPRESSOR A3 SIZE	XX	
	SZA.4	COMPRESSOR A4 SIZE	XX	
	SZB.1	COMPRESSOR B1 SIZE	XX	
UNIT	SZB.2	COMPRESSOR B2 SIZE	XX	
	SZB.3	COMPRESSOR B3 SIZE	XX	
	SZB.4	COMPRESSOR B4 SIZE	XX	
	SH.SP	SUPERHEAT SETPOINT	XX.X ∆F	
	FAN.S	FAN STAGING SELECT	X	
	EXV	EXV MODULE INSTALLED	YES/NO	
	A1.TY	COMPRESSOR A1 DIGITAL?	YES/NO	
	MAX.T	MAXIMUM A1 UNLOAD TIME	XX	

PRESS ESCAPE KEY TO DISPLAY 'UNIT'. PRESS DOWN ARROW KEY TO DISPLAY 'OPT1'.
PRESS ENTER KEY. RECORD CONFIGURATION INFORMATION BELOW:

OPTIONS1 (Options Configuration)

SUBMODE	ITEM	ITEM EXPANSION	DISPLAY	ENTRY
		UNIT OPTIONS 1 HARDWARE		
	FLUD	COOLER FLUID	X	
	MLV.S	MINIMUM LOAD VALVE SELECT	YES/NO	
	D.G.EN	DISCHARGE GAS TEMP ENABLE	ENBL/DSBL	
	CSB.E	CSB BOARDS ENABLE	ENBL/DSBL	
	CPC	COOLER PUMP CONTROL	ON/OFF	
	PM1E	COOLER PUMP 1 ENABLE	YES/NO	
	PM2E	COOLER PUMP 2 ENABLE	YES/NO	
OPT1	PM.P.S	COOLER PMP PERIODIC STRT	YES/NO	
	PM.SL	COOLER PUMP SELECT	X	
	PM.DY	COOLER PUMP SHUTDOWN DLY	XX MIN	
	PM.DT	PUMP CHANGEOVER HOURS	XXXX HRS	
	ROT.P	ROTATE COOLER PUMPS NOW	YES/NO	
	EMM	EMM MODULE INSTALLED	YES/NO	
	CND.T	CND HX TYP 0=RTPF 1=MCHX	0/1	
	MOPS	EXV MOP SET POINT	XX	
	APPR	CONFIG APPROACH SETPOINT	XX	

III. Unit Start-Up (cont)

PRESS ESCAPE KEY TO DISPLAY 'OPT1'. PRESS DOWN ARROW KEY TO DISPLAY 'OPT2'.
PRESS ENTER KEY.

RECORD CONFIGURATION INFORMATION BELOW.

OPTIONS2 (Options Configuration)

SUBMODE	ITEM	ITEM EXPANSION	DISPLAY	ENTRY
		UNIT OPTIONS 2 CONTROLS		
	CTRL	CONTROL METHOD	X	
	LOAD	LOADING SEQUENCE SELECT	X	
	LLCS	LEAD/LAG CIRCUIT SELECT	X	
	LCWT	HIGH LCW ALERT LIMIT	XX.X ΔF	
	DELY	MINUTES OFF TIME	XX	
	ICE.M	ICE MODE ENABLE	ENBL/DSBL	
OPT2	CLS.C	CLOSE CONTROL SELECT	ENBL/DSBL	
	LS.MD	LOW SOUND MODE SELECT	X	
	LS.ST	LOW SOUND START TIME	00:00	
	LS.ND	LOW SOUND END TIME	00:00	
	LS.LT	LOW SOUND CAPACITY LIMIT	XXX %	
	CTRL	CONTROL METHOD	X	
	CCNA	CCN ADDRESS	XXX	
	CCNB	CCN BUS NUMBER	XXX	

PRESS ESCAPE KEY TO DISPLAY 'OPT2'. PRESS DOWN ARROW KEY TO DISPLAY 'CCN'.
PRESS ENTER KEY.

RECORD CONFIGURATION INFORMATION BELOW.

CCN (CCN Network Configuration)

SUB-MODE	ITEM	ITEM EXPANSION	DISPLAY	ENTRY
	CCNA	CCN ADDRESS	XXX	
CCN	CCNB	CCN BUS NUMBER	XXX	
	BAUD	CCN BAUD RATE	X	

PRESS ESCAPE KEY TO DISPLAY 'CCN'. PRESS DOWN ARROW KEY TO DISPLAY 'HP.A'.
PRESS ENTER KEY.

RECORD CONFIGURATION INFORMATION BELOW.

HP.A (Head Pressure Cmp. Delta Configuration)

SUB-MODE	ITEM	ITEM EXPANSION	DISPLAY	ENTRY
	A1.DT	SCT DELTA FOR COMP A1	XX	
HP.A	A2.DT	SCT DELTA FOR COMP A2	XX	

PRESS ESCAPE KEY TO DISPLAY 'HP.A'. PRESS DOWN ARROW KEY TO DISPLAY 'HP.B'.
PRESS ENTER KEY.

RECORD CONFIGURATION INFORMATION BELOW.

HP.B (Head Pressure Cmp. Delta Configuration)

SUB-MODE	ITEM	ITEM EXPANSION	DISPLAY	ENTRY
	B1.DT	SCT DELTA FOR COMP B1	XX	
HP.B	B2.DT	SCT DELTA FOR COMP B2	XX	

CUT ALONG DOTTED LINE

III. Unit Start-Up (cont)

PRESS ESCAPE KEY TO DISPLAY 'HP.B'. PRESS DOWN ARROW KEY TO DISPLAY 'EXV.A'.
PRESS ENTER KEY.

RECORD CONFIGURATION INFORMATION BELOW.

EXV.A (Circuit A EXV Configuration)

SUB-MODE	ITEM	ITEM EXPANSION	DISPLAY	ENTRY
	STR.A	EXV CIRC.A START POS	XXX	
	MIN.A	EXV CIRC.A MIN POSITION	XXX	
	RNG.A	EXVA STEPS IN RANGE	XXXXX	
	SPD.A	EXVA STEPS PER SECOND	XXXXX	
	POF.A	EXVA FAIL POSITION IN %	XXX	
	MIN.A	EXVA MINIMUM STEPS	XXXXX	
	MAX.A	EXVA MAXIMUM STEPS	XXXXX	
	OVR.A	EXVA OVERRUN STEPS	XXX	
EXV.A	TYP.A	EXVA STEPPER TYPE	0,1	
	H.SCT	HIGH SCT THRESHOLD	XXX	
	X.PCT	OPEN EXV X% ON 2ND COMP	XX	
	X.PER	MOVE EXV X% ON DISCRSOL	XX	
	A.PCT	PRE-OPEN EXV - FAN ADDING	XXX	
	M.PCT	PRE-CLOSE EXV - FAN SUB	XXX	
	S.PCT	PRE-CLOSE EXV - LAG SHUT	XXX	
	DELY	LAG START DELAY	XXX	

PRESS ESCAPE KEY TO DISPLAY 'EXV.A'. PRESS DOWN ARROW KEY TO DISPLAY 'EXV.B'.
PRESS ENTER KEY.

RECORD CONFIGURATION INFORMATION BELOW.

EXV.B (Circuit B EXV Configuration)

SUB-MODE	ITEM	ITEM EXPANSION	DISPLAY	ENTRY
	STR.B	EXV CIRC.B START POS	XXX	
	MIN.B	EXV CIRC.B MIN POSITION	XXX	
	RNG.B	EXVB STEPS IN RANGE	XXXXX	
	SPD.B	EXVB STEPS PER SECOND	XXXXX	
EXV.B	POF.B	EXVB FAIL POSITION IN %	XXX	
	MIN.B	EXVB MINIMUM STEPS	XXXXX	
	MAX.B	EXVB MAXIMUM STEPS	XXXXX	
	OVR.AB	EXVB OVERRUN STEPS	XXX	
	TYP.B	EXVB STEPPER TYPE	0,1	

PRESS ESCAPE KEY TO DISPLAY 'EXV.B'. PRESS DOWN ARROW KEY TO DISPLAY 'MM'.
PRESS ENTER KEY.

RECORD CONFIGURATION INFORMATION BELOW.

MM (Motormaster Configuration Settings)

SUB-MODE	ITEM	ITEM EXPANSION	DISPLAY	ENTRY
	MMR.S	MOTORMASTER SELECT	YES/NO	
	P.GAN	HEAD PRESSURE P GAIN	XX	
MM	I.GAN	HEAD PRESSURE I GAIN	XX.X	
	D.GAN	HEAD PRESSURE D GAIN	XX.X	
	MIN.S	MINIMUM FAN SPEED	XX	

III. Unit Start-Up (cont)

PRESS ESCAPE KEY TO DISPLAY 'MM'. PRESS DOWN ARROW KEY TO DISPLAY 'RSET'.
PRESS ENTER KEY.

RECORD CONFIGURATION INFORMATION BELOW.

RSET (Reset Configuration Settings)

SUBMODE	ITEM	ITEM EXPANSION	DISPLAY	ENTRY
RSET		RESET COOL TEMP		
	CRST	COOLING RESET TYPE	X	
	MA.DG	4-20 - DEGREES RESET	XX.X °F	
	RM.NO	REMOTE - NO RESET TEMP	XXX.X °F	
	RM.F	REMOTE - FULL RESET TEMP	XXX.X °F	
	RM.DG	REMOTE - DEGREES RESET	XX.X °F	
	RT.NO	RETURN - NO RESET TEMP	XXX.X °F	
	RT.F	RETURN - FULL RESET TEMP	XXX.X °F	
	RT.DG	RETURN - DEGREES RESET	XX.X °F	
	DMDC	DEMAND LIMIT SELECT	X	
	DM20	DEMAND LIMIT AT 20 MA	XXX %	
	SHNM	LOADSHED GROUP NUMBER	XXX	
	SHDL	LOADSHED DEMAND DELTA	XXX %	
	SHTM	MAXIMUM LOADSHED TIME	XXX	
	DLS1	DEMAND LIMIT SWITCH 1	XXX %	
	DLS2	DEMAND LIMIT SWITCH 2	XXX %	
	LLEN	LEAD/LAG CHILLER ENABLE	ENBL/DSBL	
	MSSL	MASTER/SLAVE SELECT	SLVE/MAST	
	SLVA	SLAVE ADDRESS	XXX	
	LLBL	LEAD/LAG BALANCE SELECT	X	
	LLBD	LEAD/LAG BALANCE DELTA	XXX	
	LLDY	LAG START DELAY	XXX	
	PARA	PARALLEL CONFIGURATION	YES/NO	

PRESS ESCAPE KEY TO DISPLAY 'RSET'. PRESS DOWN ARROW KEY TO DISPLAY 'SLCT'.
PRESS ENTER KEY.

RECORD CONFIGURATION INFORMATION BELOW:

SLCT (Setpoint and Ramp Load Configuration)

SUBMODE	ITEM	ITEM EXPANSION	DISPLAY	ENTRY
SLCT		SETPOINT AND RAMP LOAD		
	CLSP	COOLING SETPOINT SELECT	X	
	RL.S	RAMP LOAD SELECT	ENBL/DSBL	
	CRMP	COOLING RAMP LOADING	X.X	
	SCHD	SCHEDULE NUMBER	XX	
	Z.GN	DEADBAND MULTIPLIER	X.X	

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CUT ALONG DOTTED LINE

III. Unit Start-Up (cont)

PRESS ESCAPE KEY SEVERAL TIMES TO GET TO THE MODE LEVEL (BLANK DISPLAY). USE THE ARROW KEYS TO SCROLL TO THE SET POINT LED. PRESS ENTER TO DISPLAY SETPOINTS. RECORD CONFIGURATION INFORMATION BELOW:

SETPOINT

SUBMODE	ITEM	ITEM EXPANSION	DISPLAY	ENTRY
COOL		COOLING SETPOINTS		
	CSP.1	COOLING SETPOINT 1	XXX.X °F	
	CSP.2	COOLING SETPOINT 2	XXX.X °F	
	CSP.3	ICE SETPOINT	XXX.X °F	
		HEAD PRESSURE SETPOINTS		
	H.DP	HEAD SET POINT	XXX.X °F	
HEAD	F.ON	FAN ON SET POINT	XXX.X °F	
	F.OFF	FAN OFF SET POINT	XXX.X °F	
	B.OFF	BASE FAN OFF DELTA TEMP	XX.X °F	
	F.DLT	FAN STAGE DELTA	XX.X °F	
FRZ		BRINE FREEZE SETPOINT		
	BR.FZ	BRINE FREEZE POINT	XXX.X °F	

III. Unit Start-Up (cont)

COMPONENT TEST

USE ESCAPE/ARROW KEYS TO ILLUMINATE CONFIGURATION LED. PRESS ENTER TO DISPLAY 'DISP'. PRESS ENTER AGAIN TO DISPLAY 'TEST' FOLLOWED BY 'OFF'. PRESS ENTER TO STOP DISPLAY AT 'OFF' AND ENTER AGAIN SO 'OFF' DISPLAY FLASHES. 'PASS' AND 'WORD' WILL FLASH IF PASSWORD NEEDS TO BE ENTERED. PRESS ENTER TO DISPLAY PASSWORD FIELD AND USE THE ENTER KEY FOR EACH OF THE FOUR PASSWORD DIGITS. USE ARROW KEYS IF PASSWORD IS OTHER THAN STANDARD. AT FLASHING 'OFF' DISPLAY, PRESS THE UP ARROW KEY TO DISPLAY 'ON' AND PRESS ENTER. ALL LED SEGMENTS AND MODE LEDS WILL LIGHT UP. PRESS ESCAPE TO STOP THE TEST. PRESS ESCAPE TO RETURN TO THE 'DISP' DISPLAY. PRESS THE ESCAPE KEY AGAIN AND USE THE ARROW KEYS TO ILLU-MINATE THE SERVICE TEST LED. PRESS ENTER TO DISPLAY 'TEST'. PRESS ENTER TO STOP DISPLAY AT 'OFF' AND ENTER AGAIN SO 'OFF' FLASHES. PRESS THE UP ARROW KEY AND ENTER TO ENABLE THE MANUAL MODE. PRESS ESCAPE AND DISPLAY NOW SAYS 'TEST' 'ON'. REFER TO THE TABLE BELOW.

Service Test Mode and Sub-Mode Directory

SUB-MODE	KEYPAD ENTRY	ITEM	DISPLAY	ITEM EXPANSION	COMMENT	Completed (Yes/No)
TEST	ENTER		ON/OFF	SERVICE TEST MODE	To Enable Service Test Mode, move Enable/Off/Remote Contact switch to OFF. Change TEST to ON. Move switch to ENABLE.	
				OUTPUTS AND PUMPS		
OUTS	ENTER	FAN1	ON/OFF	FAN 1 RELAY	Condenser fan contactor 1	
	↓	FAN2	ON/OFF	FAN 2 RELAY	Condenser fan contactor 2	
	↓	FAN3	ON/OFF	FAN 3 RELAY	Condenser fan contactor 3	
	↓	FAN4	ON/OFF	FAN 4 RELAY	Condenser fan contactor 4	
	↓	FAN5	ON/OFF	FAN 5 RELAY	Condenser fan contactor 5	
	↓	FAN6	ON/OFF	FAN 6 RELAY	Condenser fan contactor 6	
	↓	V.HPA	XXX%	VAR HEAD PRESS %		
	↓	V.HPB	XXX%	VAR HEAD PRESS %		
	↓	CLP.1	ON/OFF	COOLER PUMP 1 RELAY		
	↓	CLP.2	ON/OFF	COOLER PUMP 2 RELAY		
	↓	CL.HT	ON/OFF	COOLER/PUMP HEATER		
	↓	RMT.A	ON/OFF	REMOTE ALARM RELAY		
				CIRCUIT A COMPRESSOR TEST		
CMPA	ENTER	CC.A1	ON/OFF	COMPRESSOR A1 RELAY		
	↓	UL.TM	0 to 15	COMP A1 UnLOAD TIME		
	↓	CC.A2	ON/OFF	COMPRESSOR A2 RELAY		
	↓	CC.A3	ON/OFF	COMPRESSOR A3 RELAY		
	↓	CC.A4	ON/OFF	COMPRESSOR A4 RELAY		
	↓	MLV	ON/OFF	MINIMUM LOAD VALVE RELAY		
				CIRCUIT B COMPRESSOR TEST		
CMPB	ENTER	CC.B1	ON/OFF	COMPRESSOR B1 RELAY	See Note	
	↓	CC.B2	ON/OFF	COMPRESSOR B2 RELAY	See Note	
	↓	CC.B3	ON/OFF	COMPRESSOR B3 RELAY	See Note	
	↓	CC.B4	ON/OFF	COMPRESSOR B4 RELAY	See Note	

NOTE: If the unit has a single circuit, the Circuit B items will not appear in the display, except the ability to configure circuit B will be displayed.

CUT ALONG DOTTED LINE